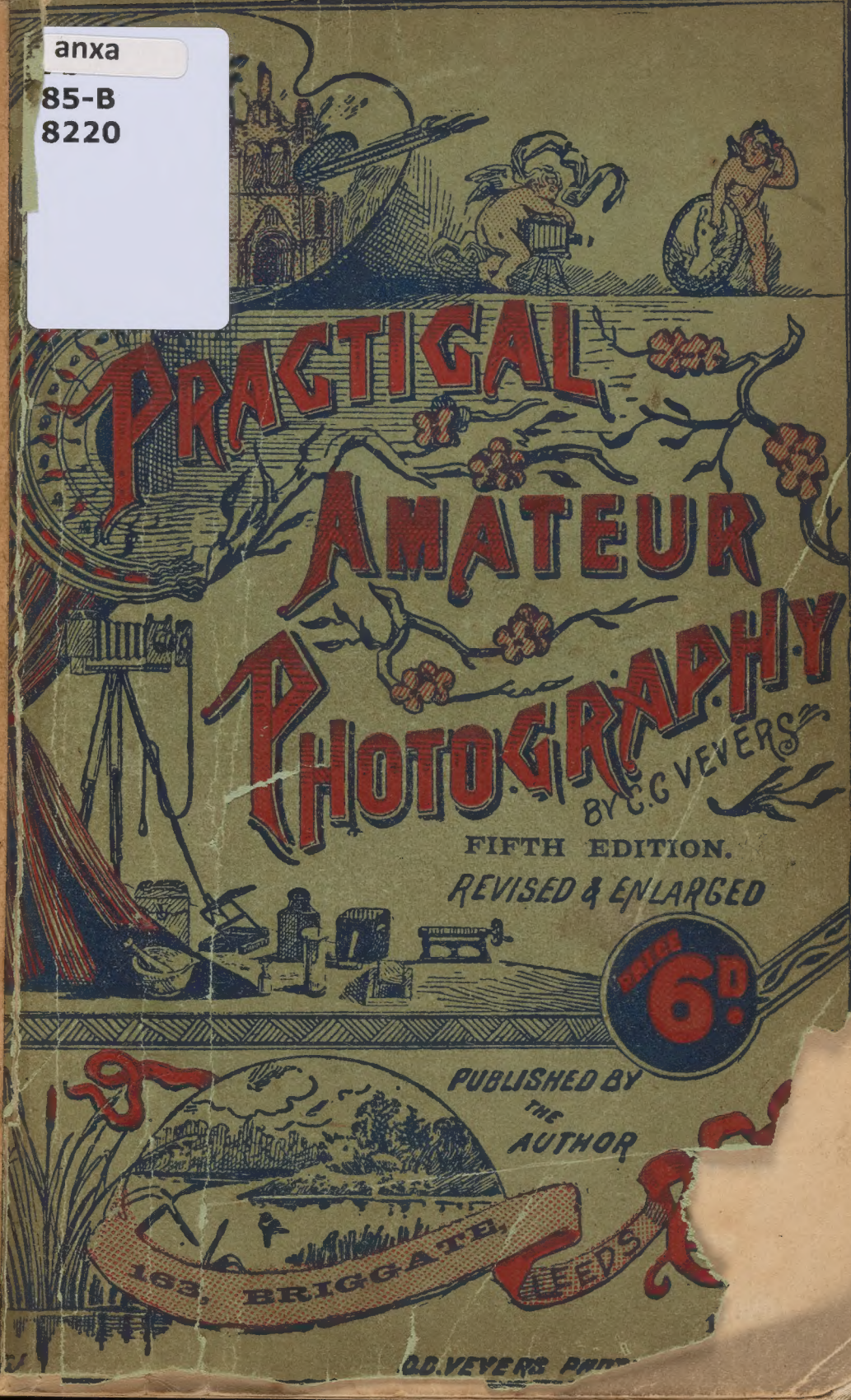


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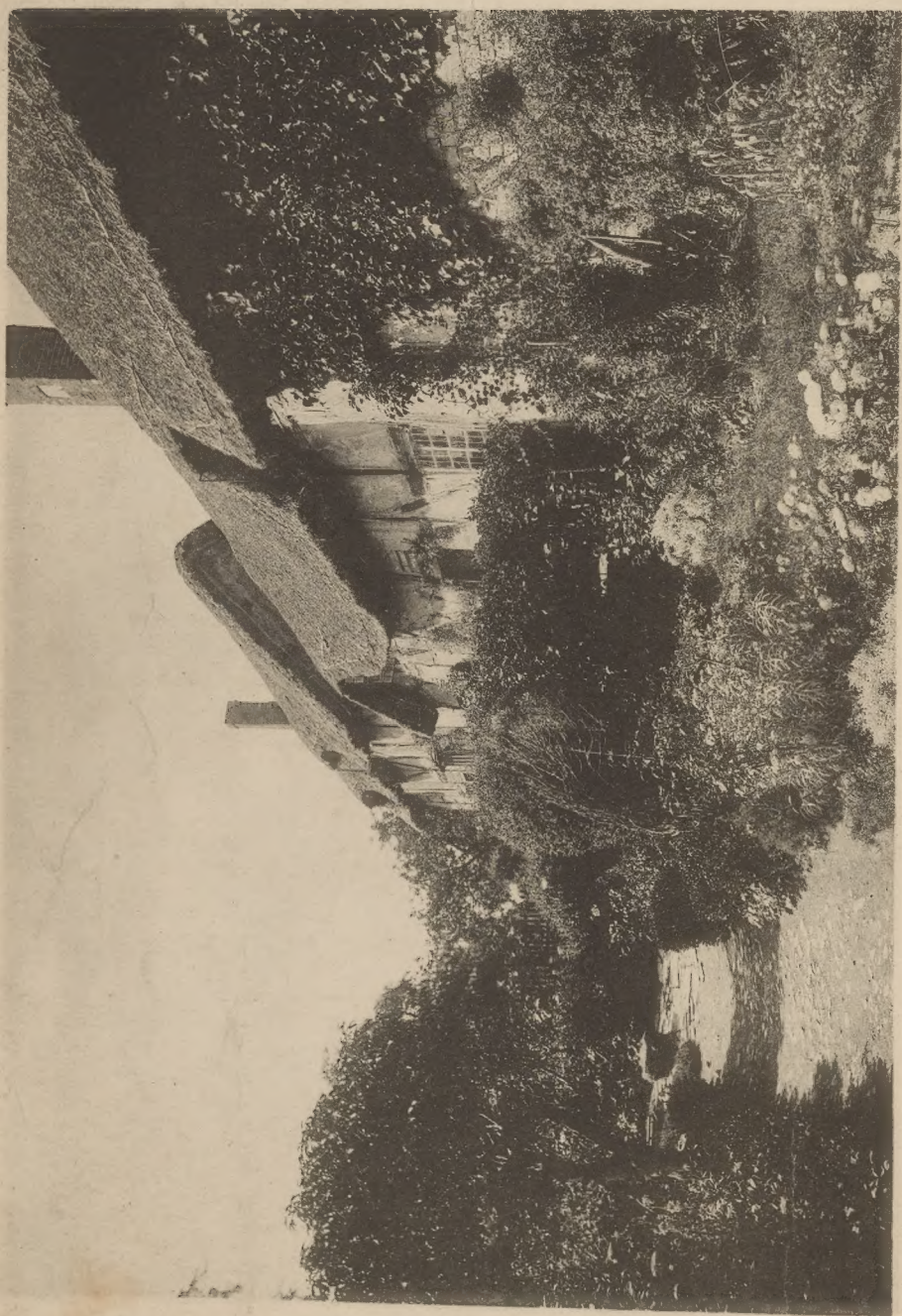
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THE HISTORY OF PHOTOGRAPHY

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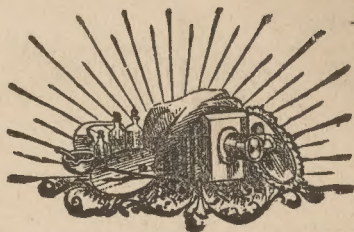
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PRACTICAL
Amateur Photography

By C. C. VEVERS,

AUTHOR OF

"Dry-Plate Photography," "Successful Photography,"
"Photographic Optics," "Enlarging," &c., &c.

❧ FIFTH EDITION. ❧

ILLUSTRATED.

LEEDS: C. C. VEVERS, 163, BRIGGATE.

LONDON: DAWBARN & WARD, LIMITED.

AND OF ALL PHOTOGRAPHIC DEALERS.

—
1896.

* *
* *At the end of the Book will be found a set of
Gummed Chemical Labels. These, when required,
can be detached by means of pen-knife or scissors,
and affixed to the bottles containing corresponding
chemicals or solutions.*

PREFACE.

THIS little manual, PRACTICAL AMATEUR PHOTOGRAPHY, has been written as a simple text-book for the beginner, and a handy work of reference for the advanced photographer, and every endeavour has been used to make it eminently practical. Technical terms and theoretic detail have been avoided as much as possible, only having been introduced when absolutely essential to elucidate my meaning; neither has the history of the art (the relation which would be of little value to the *practical* photographer) been introduced.

The work has been divided into two parts. Part I. is written as a guide to those who are totally uninitiated in the mysteries of photography. In this part I have described in the plainest possible manner the process of taking, developing, printing, and finishing the photograph; leaving out all unnecessary branches of the art, but explaining fully all that it is necessary to know in order to produce a successful photograph; and have given only *one* formula—that which by experience has been found to be the most simple and reliable—for each operation, so that the beginner may not be confused by various alternative methods.

Part II. (which might perhaps be more suitably termed the appendix) is more advanced, and contains many alternative formulæ and other useful information for those who have mastered the rudiments of the process; thus, this part contains directions for working Celluloid and Eastman Films, Carbon, Platinotype, and other printing processes, and various developers and toning formulæ.

Finally, let me advise the amateur, if he wish to be successful, to make up his mind at the commencement not to be beaten: get to the bottom of everything, and don't be disheartened at non-success—*there is more to be learnt from failures than from successes*; failures, at times, are certain to occur; when they do, do not blame instructions, chemicals, or apparatus—nine times out of ten it is the operator who is wrong; he should then find out where he *is* wrong, and when he has done so, he will perhaps recall to mind the old proverb,

EXPERIENTIA DOCET.

PREFACE TO FIFTH EDITION.

Since the publication of the last edition several important advances have been made in photography, notably in printing methods, and in developing agents. The adoption of gelatino-chloride printing in preference for albumen has now become almost universal, it has, therefore, been deemed advisable to replace the latter with the more modern process in the present edition. The separate and combined toning baths will be found fully treated upon in Parts I. and II. respectively. The latter portion of the book also contains reliable formulæ for the new developers, and much new matter of interest to the amateur.

The growing popularity of the hand camera has necessitated a special chapter being devoted to its selection and use, and the present edition has been considerably enlarged.

C. C. V.

September, 1896.

PRACTICAL Amateur Photography.

PART I.

APPARATUS, MATERIALS, AND CHEMICALS.

FOR the general convenience of makers and users, the glass plates bearing the sensitive film necessary for making negatives are cut to certain sizes, and the various apparatus required with which these plates are used are constructed to correspond with them. The standard sizes of plates as used in England are :—

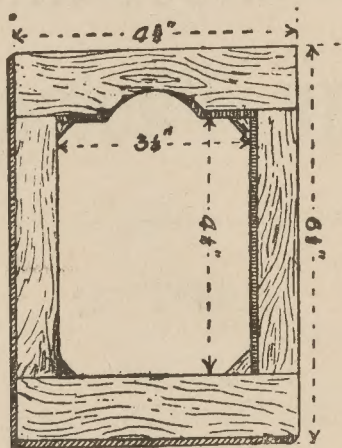
Quarter-plate ($\frac{1}{4}$)	measuring	$4\frac{1}{4}$ in.	by	$3\frac{1}{4}$ in.
Half-plate ($\frac{1}{2}$)	„	$6\frac{1}{2}$ in.	by	$4\frac{3}{4}$ in.
Whole-plate ($\frac{1}{1}$)	„	$8\frac{1}{2}$ in.	by	$6\frac{1}{2}$ in.

10 by 8, 12 by 10, and upwards.

Several smaller and intermediate sizes are also made, but are not so much in vogue as the above.

Before purchasing his apparatus the beginner must first decide upon the size he intends to use, and this will, of course be regulated to a great extent by monetary and other considerations. The most popular amongst amateurs are the three first sizes, the $\frac{1}{4}$ -plate producing the well-known “Carte-de-Visite” picture, while the $\frac{1}{2}$ -plate is used for “Cabinet” Photographs. Of course, the apparatus increases in bulk, weight, and cost, with the size of the plate to be used ; with the increase of size, too, the difficulties of manipulating the camera are also augmented. It is hardly necessary to say that until the amateur is able to produce a good picture, plates of the

smallest size should be used, but, at the same time, by a very simple contrivance, termed a "carrier" or "inner



Carrier or Inner Frame.

frame," $\frac{1}{4}$ -plates may be exposed in camera constructed for larger sizes.

It is certainly unadvisable that the beginner should purchase apparatus larger than $\frac{1}{2}$ -plate size, and, perhaps, he may find that $\frac{1}{4}$ -plates are sufficiently large for all the work he may wish to do for some time to come ; the latter is a suitable size for making lantern slides, and enlarged prints to almost any size can be made with very little additional expense. Above all, to do good work the apparatus should be the best that can be obtained, and *must* be perfect in every respect ; unless it is so, the tyro will meet with failure on every hand, and for this reason he should not be advised to buy a second-hand set without first seeing it, and having it carefully examined and tested by an expert, or, at least, some amateur friend well up in the art. Many old, disabled "wet-plate" sets are sold to the uninitiated at prices many times their value, and he will find it by far the cheapest in the end to go to a respectable firm and pay a fair price for everything he requires : a good maker, and good price : good apparatus and good work will result—or the amateur will know on whose side the cause of failure arises.

It is far better to purchase a $\frac{1}{4}$ -plate camera, lens, &c.,

of the best quality, than a low-priced $\frac{1}{2}$ -plate set of doubtful make. Hand cameras, roll-holders, changing-backs, and unusual forms of apparatus, although often very useful, only tend to confuse and increase the difficulties of the beginner, and should, therefore, be avoided until experience has been obtained by the use of the more simple and practicable form of apparatus. Many dealers make up their apparatus and chemicals into sets containing everything required, and these save the purchaser considerable trouble in selection, but frequently are found to include more in the way of sundries than is absolutely essential for the beginner's requirements.

The following is a list of the necessary apparatus, materials and chemicals :—

Portable camera, with one or more double dark slides.

Landscape lens.

Portable tripod stand, with wood or brass head.

Focussing cloth.

Two or three dishes of celluloid, fibre, or porcelain.

One 2 oz. and one minim graduated glass measure.

Ruby medium or lamp.

One or two printing frames.

Set of scales and weights.

Two glass cutting shapes for trimming prints ; one cutting shape should be "plate" size (4 by 3 for $\frac{1}{4}$ -plates ; $6\frac{1}{4}$ by $4\frac{1}{2}$ for $\frac{1}{2}$ -plates), and one "album" size, (*i.e.*, Carte-de-Visite or Cabinet).

Several narrow and wide-mouthed stopped bottles.

About 100 C-de-V. or Cabinet mounts.

Note book.

Dry-plates.

Sensitized paper.

Chemicals :—

4 oz. liquor ammonia .880.

1 oz. pyrogallic acid (Schering's).

1 oz. potassium bromide.

1 lb. hyposulphite of soda.

1 oz. ammonium sulphocyanide.

$\frac{1}{2}$ pint best negative varnish.

1 15 gr. tube gold chloride.

2 oz. acetate of soda.



Stopped bottle.

The following, although not essential at first, are certain to be needed eventually ; it is therefore advisable to purchase them with the others :—

Plate box for storing sensitive plates.

Camera case.

Instantaneous shutter. View finder.

One or two 10 by 8 porcelain dishes for toning, &c.

Changing bag or box.

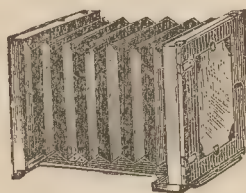
Focussing eyepiece.

Burnisher.

Head-rest. Washing Apparatus.

Mounting medium.

THE CAMERA should be what is known as a tourist's or landscape camera, made of mahogany. It should be light and well made, easily and quickly opened or closed, rigid when open, compact when shut up, and free from loose or



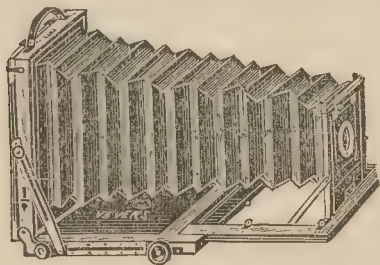
Open.



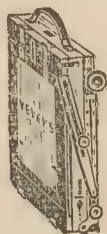
Shut.

Cheap form of Tourist's Camera.

complicated parts. It should have a bellows or concertina body, which should extend to at least twice the "equivalent focal length" of the lens, or, in simpler language : a $\frac{1}{4}$ -plate camera when opened out to its fullest extent



Camera at longest extension.

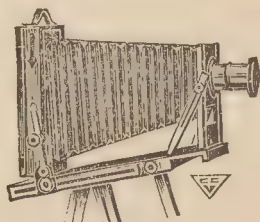


Camera closed.

Superior form of Camera.

should measure from front to back not less than 9 inches, a $\frac{1}{2}$ -plate to 14 inches. Double extension or "long focus" cameras are manufactured, having twice the usual length of bellows, which render them very suitable for copying and other purposes. A sliding front, having a vertical and horizontal movement, especially the former, is also a useful adjunct, by means of which the lens may be brought opposite any part of the focussing screen without tilting the camera, which is very undesirable when taking buildings or other objects having straight vertical lines.

An arrangement, termed a "swing-back," for bringing the top (vertical) or one side (horizontal) of the camera-back nearer the lens than the other, should be fitted to the larger sizes of cameras, but may be dispensed with in the $\frac{1}{4}$ -plate size. At the back of the camera is a sheet of very finely ground glass, the rough surface facing the front; this is the "focussing screen," upon which the image is shown in an inverted form: it should be hinged to the top of the camera so that it may

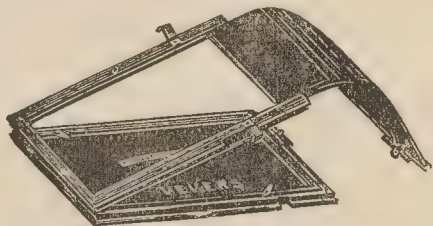


Showing Swing-back in use.

be folded over the bellows for the insertion of the dark slide, or, on the better class instruments, with double jointed hinges to fold over the slide. The camera should be constructed to take the picture in either a horizontal or vertical position as desired: a very simple and useful contrivance is what is known as a "reversing frame," being so formed that the dark slide can be inserted as desired without turning the camera on its side. Two useful forms of cameras, having most of the movements described above are shown on the opposite page.

THE DARK SLIDE is a kind of case in which the sensitive plates are inserted, and afterwards exposed in

the camera ; it is made to fit into grooves in the camera back, and is therefore sold with, and is really a part of, the camera. Each slide should carry two plates, and is then termed a "double" dark slide. A sliding shutter

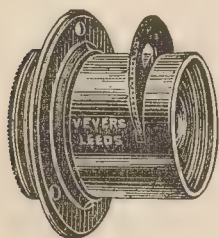


Double Slide.

at each side may be withdrawn when in the camera, thus exposing the plate to the rays of light passing through the lens ; these shutters should be hinged so that they may be turned along the camera side or under the focussing screen when open, thus presenting a minimum of surface to the wind. Three slides, to take six plates, are a useful number for a tourist's outfit, but additional ones can always be purchased when required.

THE LENS is the most important part of the apparatus, and is certainly the most difficult and confusing to buy. Photographic lenses may be roughly divided into two classes, portrait and landscape ; while the latter will generally take passable portraits, a portrait lens cannot be used for landscapes, therefore it is of no use to the amateur who can only afford one lens. There are several forms of landscape lenses manufactured, and as almost every maker has a different name for his own goods, it may easily be imagined that the uninitiated finds it nearly impossible to select the most suitable form for "all-round" work. The three principle types of landscape lenses are commonly known as single, rectilinear (or rapid doublet) and wide angle ; as the latter is constructed for taking views or buildings in confined situations and other particular purposes, this form may be put on one side as unsuitable for the beginner. The purchaser, then, is left to choose between the "single"—which is a combination of two or more glasses fixed

at the back of the mount—or the “rectilinear”—which has two symmetrical combinations, one at each end of the tube. Of these, the single lens is undoubtedly the best for taking landscapes “pure and simple,” but the rectilinear far surpasses it for general utility ; it is very “quick acting,” being the most suitable for instantaneous



Single Lens.



Rectilinear Lens.

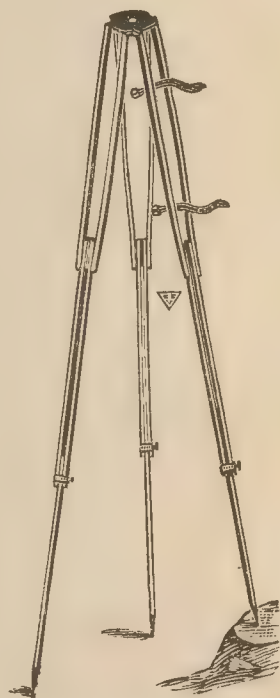
photography, will take excellent portraits, and for reasons which are too lengthy to explain here, is also the best for architectural subjects and copying. By unscrewing the front combination the lens can be used as a single one for landscapes, &c., the length of focus and covering power being doubled, and the necessary exposure quadrupled. An excellent form of rapid lens,—the “Euryscope,”—more rapid than the above, has recently come into favour ; for general purposes, however, it does not equal the rectilinear, although for instantaneous work and portraiture only, it is unsurpassed. A cheap form of the rectilinear type—known as “periscopic rectilinear”—can be purchased, but as this is “non-achromatic” or uncorrected for colour dispersion (whereby a sharp image is not produced upon the negative) its use cannot be recommended. To preserve the lens from injury, and the mount from becoming tarnished, a bag of chamois leather should be made in which to carry the instrument. More complete information on the forms and uses of lenses will be found in No. 2 of Vevers’ Photographic Primers—“Photographic Optics,” price 2d.

STOPS.—With each lens should be supplied a set of “diaphragms” or “stops,”—these are pieces of blackened brass, each having a different sized hole in the

centre. One of these is inserted at the front in single lenses and between the lenses in "doublets," the smaller the opening in the stop used the "sharper" or clearer will be the image on the ground glass, but, what is, very important to remember, *for each sized smaller stop used the exposure required is almost doubled*, owing to less light being allowed to pass through the lens, so that great discretion is necessary in the selection of the stop to be used. The more expensive single lenses have a circular diaphragm, perforated with various sized openings, fixed to the lens mount, which may be rotated until the desired aperture is brought in front of the lens. The iris diaphragm, is now applied to the more expensive photographic lenses, loose stops being then dispensed with.

THE TRIPOD STAND while being light should also be strong and firm when erected; it should not stand less than five feet high so as to bring the camera level with the operator's eyes. The best form of stand has telescopic sliding legs, which may be adjusted to any height, thus making it convenient for working on uneven ground. A more portable form for cyclists and others is made with two or three joints. A leather strap with handle should be provided for carrying the tripod.

THE FOCUSsing CLOTH should measure about three feet square. The best material for making it is black velvet, but two thicknesses of black twill will answer the purpose almost as well.



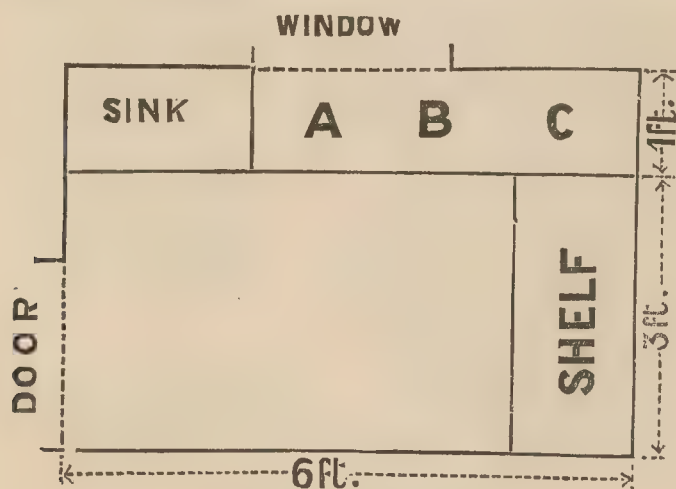
Tripod Stand.

THE DARK-ROOM.

The box containing the dry plates will bear a notice something like this: "CAUTION: these plates must

be opened only in ruby light." This will probably perplex the beginner, but its meaning will be made clear by the following explanation. The sun's rays, or white light, as they are called, are composed of several different colours—violet, yellow, and red being the three primary or most prominent. The violet has the chemical, yellow the illuminating, and the red rays the heating property. On exposing a sensitive film to daylight it is acted upon by the violet rays only, and these are consequently termed "actinic," while the yellow and red, causing no change on the sensitive film, are spoken of as being "non-actinic."

It is obvious, then, that if the packet of plates be opened in actinic light its contents will at once be spoilt—"fogged" it is technically termed—even if exposed for but a fraction of a second. To be enabled to manipulate the sensitive plate the amateur must have what is called a "dark room" in which to work. But although "dark" in a chemical sense, this room should by no means be dark to the operator's eyes; it should be plentifully illuminated, but with a "non-actinic light." All blue and violet light must be excluded, and this may easily be done by filtering white light through a ruby or non-actinic medium.



Plan of Dark-Room.

The room which is to be converted into a dark-room should be of ample dimensions, certainly not less than six feet by four feet, should contain a bench or table opposite the ruby light, one or two shelves at a convenient height to hold chemical bottles, dishes, &c., and, if possible, a small sink with water laid on, the tap reaching to the centre of the sink and having a rose jet attached for washing the negatives and prints. If a sink and water supply is not attainable, two pails, one containing clean water, the other empty, may be substituted.

Either daylight or artificial light may be employed to illuminate the room, but the former is by far the more pleasant and healthy. The window should measure not less than fifteen by twelve inches, must be glazed with ruby glass, and over this must be placed a sheet of non-actinic medium, which may be obtained from the photographic dealers; the latter serves to diffuse the light, when it is not so liable to fog the plates as is direct



Dark Room Lamp.



Tourist's Folding Lamp.

light. If preferred an extra sheet of the medium may be used in place of the ruby glass. These will be sufficient protection if the sun does not shine directly on to the window, when this occurs another piece of the non-actinic medium should be added.

Ruby lamps and lanterns are manufactured expressly for photographic purposes, and may be had at various prices.

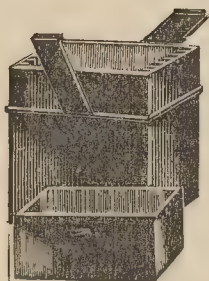
When everything is finished the room should be *carefully* examined and every chink or aperture, however insignificant, admitting white light filled up with putty or white-lead. If light enters between the door and the doorpost, an opaque curtain should be hung across the room. It is a matter of the utmost importance to remember that the room must be illuminated by non-actinic light only: the smallest trace of white light will fog the plates.

CHARGING THE SLIDES AND PACKING APPARATUS.

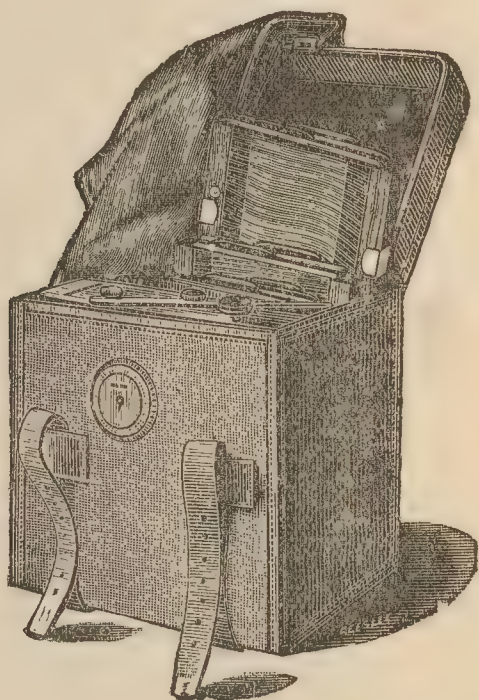
THE dark-room finished, the amateur may at any time get his apparatus ready for action. If the camera and lens have been purchased separately, the lens must be fixed to the camera front. Draw two lines from opposite corners of the front, these bisect at the centre, from which a circle is described exactly the diameter of the inside of the lens "flange," *i.e.*, the circular piece of brass having three screw holes through it, and which is screwed to the back of the lens mount. The hole is turned out or cut with a fretsaw, and over this the flange is screwed. The whole apparatus should now be fitted up and examined to see that it is complete, and that everything works properly.

The dark slide and box of plates are taken into the dark-room, the door closed, and, if the room is white-light-tight, the packet of plates may be opened and the required number inserted in the slides, the remainder being carefully re-wrapped and returned to the box, or

removed to a plate-box as illustrated, from which they can be taken when required with greater ease. The sensitive plates have a white creamy appearance, not unlike china; the sensitive or film side may be distinguished by its matt or non-reflective surface. The plates are inserted in the slide with their film side outwards,



Metal Plate-box.



Camera Case

i.e., facing the sliding shutters, the black division is placed between them, and the slide closed and fastened at the outside with the catches.

The apparatus should now be packed, care being taken to check off every article as it is placed in the case,—a very useful form with partitions for camera, lens, and dark slides is shown on this page. This simple matter should *never* be omitted, as it is not a little aggravating to find, when several miles from home, that the tripod screw or diaphragms have been forgotten.

SELECTING THE POINT OF VIEW.

It is hardly necessary to say that at first the amateur should practice upon a view or other simple and immovable object.

Having decided upon a suitable subject do not commence operations at once, but walk from place to place and examine it from different points until the position showing the view, or whatever it is, to the greatest advantage has been found. Next erect the apparatus, and see that everything is tight and rigid; with a soft handkerchief of chamois leather carefully clean the glass of the lens, see the focussing screen is right, remove the cap from the lens, and proceed

TO FOCUS.

The size of the image on the ground glass depends upon the distance the apparatus is from the subject. Suppose the view to be taken appears too small on the ground glass, the camera must be moved forward, and *vice versa*. The subject should not fill the whole of the glass, as a margin is afterwards cut away when trimming the prints. A simple way to show the size of the finished picture is to run a pencil round the sides of the cutting shape, placed in the centre of the focussing screen on the ground side.

If possible, the landscape should be lighted from behind or a little on one side of the camera: the sun must never be shining directly in front of the lens.

Now cover your head and all the camera, except the lens, with the focussing cloth, so as to exclude all light but that which passes through the lens, move the body of the camera backwards and forwards until the inverted image is shown on the ground glass perfectly sharp and clear, always focussing for the central or most prominent object. If the lens is mounted in sliding tubes, the "fine" focussing may be done by sliding the lens in or out.

The picture will perhaps appear indistinct or "fuzzy" at the edges and corners; to make it equally "sharp,"

the aperture of the lens must be reduced by inserting stops until the desired effect is produced, remembering at the same time that the plate will require longer exposure for each smaller stop used.

EXPOSURE.

THE FOCUS obtained, the cap must be securely replaced on the lens hood, the focussing screen is next folded back and the dark slide inserted in its place ; the camera back and slide are covered with the focussing cloth and the shutter nearest the lens gently drawn out as far as it will go, at the same time holding the slide in its place with the left hand.

It is impossible to give the exact time of exposure required, as it depends entirely upon the intensity of the light, the rapidity of the plates and lens used, the size of stop, the colour of the surroundings, and the time of the year. For a well-lighted landscape, using ordinary plates, landscape lens with medium stop, an exposure of from two to four seconds may be given. On a hot summer's day the atmosphere is often hazy and highly charged with non-actinic light, while after—or even during—a shower of rain the atmosphere is generally clear and bright.

The time of day is an important factor in determining the exposure required: thus, a view requiring only a second or two at noon must have almost as many minutes after sunset. Then, again, the openness of the view must be taken into consideration: a view of the sea may require only a second, or perhaps instantaneous exposure, while for a landscape overhung with foliage, or a street under the same conditions, it will be necessary to give an exposure from thirty seconds to three minutes. The colour of the object also makes a difference: whites and blues are rapid; red, brown, green, and yellow are more or less non-actinic. Water, snow, and cloud pictures only require a minimum of time to act upon the sensitive plate.

Before the slide has been removed from the camera, a memorandum of the exposure and other details should be entered in a note-book, which is divided into spaces for the purpose. As an example, the following entry is extracted from an amateur's note book:—

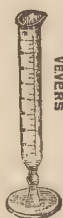
DATE.	TIME.	NO. OF PLATE.	SUBJECT.	EXPOSURE.
14/10/86	2.10 p.m.	3	Bolton Abbey.	5 secs.
MAKE OF PLATE.	STOP.	REMARKS.		
"Ilford Ordinary."	f 32	Faint Sunlight, exposure correct.		

DEVELOPMENT.

THE plate, if examined in the dark room, will present exactly the same appearance after exposure as it did when first taken from the box. It is now necessary to bring out or "develop" the "latent" or invisible image, and for this purpose various chemicals in solution are



Graduated Glass Measures.



Apothecaries' Scales.

required. There are several methods of development, amongst which may be mentioned, pyro (with ammonia,

potash or soda), hydroquinone, ferrous-oxalate, amidol, metol, eikonogen, &c. The former is perhaps still the best for general work—particularly in the hands of the beginner—as it is more easily regulated for incorrect exposure than are some of the more recent developers; but formulæ for the other forms will be found in Part II.

With each box of plates purchased instructions are given for preparing the developer as recommended by the maker, but the following will be found to work all the best brands equally well.

A 10-oz. stoppered bottle is taken, and the following is poured into it, the stopper replaced, and the bottle labelled

“No. 1. AMMONIA, 10% SOL.”

Ammonia	·880	...	...	...	1 oz.
Water	...	...	...	...	9 oz.

Put into a 5-oz. bottle labelled

“No. 2. BROMIDE, 10% SOL.”

Ammonium Bromide	...	...	...	$\frac{1}{2}$ oz.
Water	...	...	fill up to	5 oz.

Before placing the solutions in the bottles the latter should be well washed in soda and hot water, and afterwards in clean cold water. If pure water—preferably distilled—be used, and the bottles kept well stoppered, these solutions will keep good indefinitely.

Three chemicals are used for developing: pyrogalllic acid, ammonia, and bromide. Each of these serve an individual purpose, which should be remembered by the operator, as, by a modification of the usual quantities over and under exposure may be corrected to a great extent.

PYROGALLIC ACID—abbreviated “to pyro.”—is *the* developer or “reducing agent.” It gives density and contrast between the lights and shades of the picture.

AMMONIA accelerates the action of the developer and produces detail. It is increased for under-exposure and reduced in quantity for over-exposure.

BROMIDE is the restrainer, by rendering the action of the developer slower it brings it more under control, keeps the shadows clear, and prevents the ammonia staining or "fogging" the plate. It is increased for over-exposure.

To develop a $\frac{1}{4}$ -plate, to an ounce of water add 40 minims (drops) of No. 1. (ammonia) solution, 20 minims No. 2 (bromide) and 2 grains dry pyro ; and stir with a glass rod. For a $\frac{1}{2}$ -plate twice the above quantities must be used. The pyro must at first be carefully weighed until the amateur is enabled to guess the exact quantity by lifting it out with a glass spoon or flat piece of wood cut to the right size.

The door is shut and all actinic light excluded ; one of the developing trays is rinsed out and placed on the table, directly opposite the ruby window or lamp. A plate is taken from the dark slide and placed, film side up, in the dish, which is then held in the left hand, and the developer quickly, but gently, poured over the plate, without a splash, if possible, so that the whole surface of the plate is instantly covered with the liquid. Unless the solution flows over the whole of the plate at once unequal development and patchy marks will probably result. There is almost a knack in doing this apparently simple operation, which requires practice to do perfectly ; perhaps it is best to use, at first, double quantities of solution.

Immediately the solution has been poured on the plate the dish is rocked from side to side, and kept moving until development is complete, so that the solution may be continually flowing over the film. If air-bubbles have been produced when pouring on the developer they must be blown away or broken with a camel-hair brush, as they will prevent the developer acting on the film, and thus leave a transparent ring wherever they have been.

If the plate has received correct exposure, portions of the picture will commence to appear in from 10 to 20 seconds ; first the sky and other very bright objects, such as water, housetops, &c., will be distinguished ; and as development proceeds the rest of the view will gradually appear, the half-tones—such as trees, figures, first—

and finally the detail in the shadows, the deepest of which should, however, remain perfectly white. When this stage has been reached, which it should be in two or three minutes from commencement, the plate may be lifted from the tray, and, holding it up to the window, examined by transmitted light; and if fully developed, every detail to be seen in the original should be clearly shown upon the plate, which, after development, is termed a "negative." Also, if examined on the back or glass side, portions of the image should be faintly visible. After use, the solution in the dish should be thrown away, as it must not be used again, and the dish washed out.

It should be understood that everything is represented on the negative exactly opposite to nature; that is, the lights and shades are reversed: black and dark objects appear more or less transparent; white portions of the view are opaque; deep shadows under bushes, &c., are white on the negative, while the sky (except in instantaneous views) is one black mass.

OVER-EXPOSURE.—Should the image appear immediately or a few seconds after the developer is poured on the plate, it is evident it has had too long exposure. The solution should at once be poured back into the measure, and from 10 to 50 drops of bromide added. This should retard the action of the developer to a great extent, but if the image is thin and weak and wanting in contrast it may be afterwards "intensified." (See "Intensification.")

UNDER-EXPOSURE.—If there is any doubt as to the time of exposure required, it is best to err on the side of *over*-exposure, as it is much easier counteracted than is *under*-exposure. The only remedy in the latter case is to increase the quantity of the No. 1 sol., but if much be added the plate will be stained or "fogged" by its action, and then rendered useless.

FIXING.

ON taking the negative from the developing dish it must at once be placed under the tap for two or three

minutes, or washed in several changes of water. It is then removed to another dish at the operator's right hand, containing a quantity of the following solution, termed the

FIXING BATH.

Hyposulphite of Soda	...	...	5 oz.
Water	...	...	1 pint.

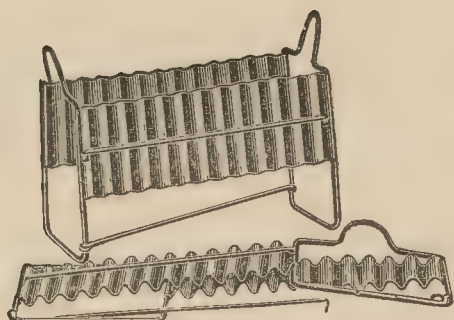
This solution may be used over and over again until much discoloured. The back of the plate before immersion in the fixing bath, is still white with the silver-bromide unacted upon by the developer. The object of the hypo solution is to dissolve this away, and, by so doing, render the negative transparent and insensitive to light. Until this is done, the plate must be manipulated in non-actinic light.

In five or ten minutes all milkiess will have disappeared from the back of the plate, which must, however, remain in the solution at least three minutes longer to ensure the thorough elimination of the silver-bromide. The door may now be opened and actinic light admitted.

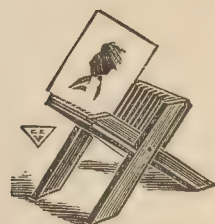
On being removed from the fixing bath the negative must be *well* washed in running water for *at least* half-an-hour. On this last thorough washing the keeping qualities of the negative depend.

In hot weather the film may show a tendency to leave the glass—generally at the edges, but sometimes in “blisters” over the surface of the negative; whenever this occurs (whether during development, fixing or washing) it should be at once immersed in a strong (saturated) solution of powdered alum for a few minutes, well washed, and the usual operations continued.

Should the negative be very thin and “flat” (*i.e.*, wanting contrast between the high lights and shadows), it may be intensified, but intensification should not be resorted to unless the image is *very* weak, as satisfactory results cannot always be depended upon with certainty.



Washing Rack.



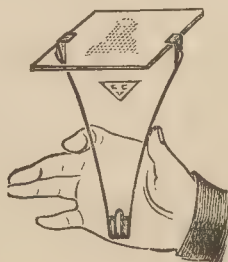
Drying Rack.

After being well washed the negative is allowed to dry naturally, which, in a dry, well ventilated room, will occupy from two to six hours. On no account must heat be applied, or the film, being composed of gelatine (which is soluble in warm water) will melt.

If it is desired to preserve the negative, when perfectly dry the film should be covered with a protecting coat of

VARNISH

specially prepared for the purpose. Warm the negative to blood-heat over a spirit lamp or before a fire, and, holding it horizontally in the left hand by one corner, film side up, pour a quantity of varnish in the centre, slowly and steadily. With a gentle movement let it cover the right top corner, then to the left top corner, down the left side to the thumb, and finally off at the right hand bottom corner, which should be rested on the mouth of the bottle for the surplus varnish to run off, at the same time rocking the negative from side to side to prevent the formation of streaky lines. When the varnish has drained off, dry the negative before the fire, and in a few minutes it will be ready for the printing frame. A handy little clip for holding the negative is here shown.



It will require some little practice to varnish a negative successfully ; coolness, deliberation, and a steady hand are the chief points required.

The negative must now be examined, and any transparent spots or other marks carefully filled in with Indian Ink or Prussian blue to the proper depth. Any dirt, varnish, or film that may be on the back of the negative must also be removed, and it is then ready for

PRINTING

Although there are many excellent printing processes, the one most generally employed at the present day, by both amateur and professional, is that known as "Gelatino-Chloride," not only on account of its extreme simplicity and cheapness, but because, also, of the pleasing variety of tones and great brilliance and detail it yields.

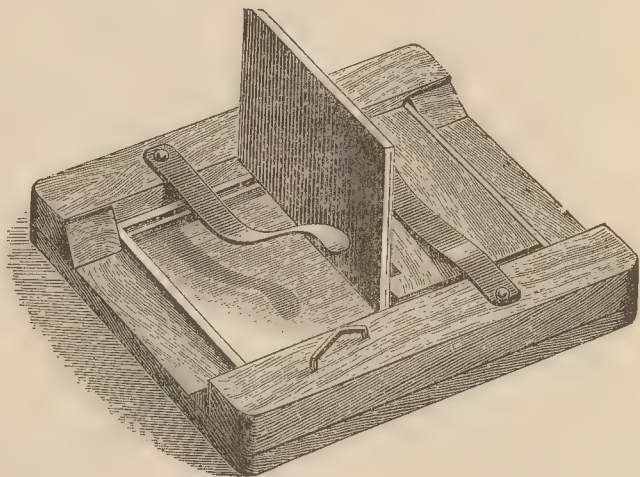
Gelatino-chloride paper is coated with a sensitive film, very similar to that employed in making dry plates ; it is sold in tubes containing two or more sheets measuring $24\frac{1}{2}$ in. \times 17 in. (which can be cut with scissors or paper knife to any size required), or in packets ready cut to $\frac{1}{4}$ -plate, Cabinet, $\frac{1}{2}$ -plate, and other sizes, at 1/- per packet, there being 36 $\frac{1}{4}$ -plate, 24 Cabinet, and 6 $\frac{1}{2}$ -plate pieces in the respective packets. It is supplied in three tints : White, Pink, and Mauve ; the white paper often appears somewhat yellow in the highlights when finished, whereas mauve yields a pure white, and is to be recommended for landscape and similar work ; whilst pink is generally adopted for portraiture.

The paper is not nearly so sensitive as dry plates—gas-light will not affect it in the slightest degree, nor will a short exposure (such as is necessary for charging the printing frames) in *very weak* daylight be injurious, but it should not be exposed longer than is absolutely necessary to daylight, however subdued.

The negative, having been dusted, is placed in the printing frame, film side up, and a piece of paper laid upon it, sensitized or glazed side down ; over this is put

two or three pieces of stout blotting paper, or a sheet of rubber, so as to ensure perfect contact between the paper and negative; next place the hinged back in its place, and bring the springs into position.

The printing frame and its contents are placed in a good light, but not in direct sunlight, unless the negative be fairly strong and dense. The time it will take to print depends upon the "density" or opacity of the negative, and the intensity of the light. Some negatives will yield a print in five or ten minutes, others require as many hours.



Printing Frame opened for the examination of Print.

The paper may be examined now and again in a weak light to see what progress has been made; this may be done without displacing the paper, by loosening *one* of the springs at the back of the frame, and, on raising one half of the hinged back, the paper may be lifted from the negative, and after a moment's examination allowed to fall into its former place, the back-board being replaced and secured with the spring.

The printing should be continued until the picture is a few shades darker than it is desired to be when finished, as, in the after processes the depth of colour is reduced

to a certain extent. The exact tone necessary can, of course, only be learnt by practical observation.

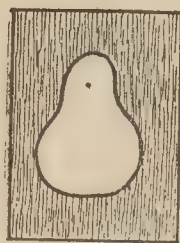
When dark enough, the print is removed from the frame (in a very weak or non-actinic light) and, if further prints be desired, a fresh piece of sensitive paper substituted, and the operation of printing again gone through, all the prints being brought to a uniform tone. As the prints are taken from the frame they should be stored in a dark drawer or box, such as the dry plates are supplied in, until the number required have been printed, when they are ready for the succeeding operations of toning, fixing and washing.

Some photographs—especially portraits—look much better with white margins or borders. There are two ways of obtaining a white margin, and both of these, if employed with taste, are productive of very artistic results.

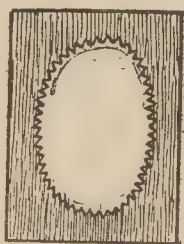
The first, and simplest, is obtained by the use of what is known as a "mask." These are simply pieces of opaque paper sharply cut or stamped with an opening of the desired size and shape. Oval, dome, square, and cushion are the forms in general use, and these are to be seen in almost every photographer's show case. The mask is placed on the negative (film side) and secured in position with gummed paper. Over this the sensitized paper is laid, and the negative then printed from as usual.

The "Vignette" is more difficult to manage, but if care be taken is capable of yielding most beautiful effects. Out of a piece of cardboard the size of the outside dimensions of the printing frame, cut a hole the shape of the picture desired, but somewhat less in size; the edges of this opening are next serrated or "gimped" about $\frac{1}{4}$ inch deep, as illustrated. This card is fixed to the frame, over the negative, by elastic bands or tacks, and the whole is then printed in diffused light, frequently turning the frame partly round, so as to equalize the direction of the light. The result—if no pains be spared—will be a picture delicately graduated into a white margin, greatly enhancing the beauty of

the photograph, and amply repaying the printer for his care and time expended in producing it.



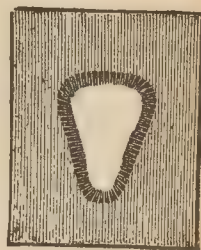
Shape of Vignette
for head and bust.



Do. for Views.



Do. for $\frac{3}{4}$ figures.



Zinc Vignette.

WASHING.

THE prints when taken from the printing frame are of a somewhat foxy-red colour. The toning bath is used to give them the more agreeable warm purple tone familiar to everyone.

A large porcelain tray is filled with clean water, and into this the prints are immersed face downwards, one by one. Each print, as it is placed in the dish, must be at once covered with water, or stains may ensue. The water is changed two or three times, after which there should be only a little milkiness, caused by the elimination of the silver-chloride from the paper; if the water is more than slightly milky the prints must be further washed. In large establishments the silver contained in the several washes is precipitated with common salt, and the residue, after being refined, is of much value to the professional; but the small quantity obtained in a twelve-month by the amateur would not recompense him for the trouble of collecting it.

HARDENING.

The toning formulæ I am about to describe consists of separate toning and fixing solutions, being more suitable for the beginner and yielding more permanent results than the more complicated "combined" baths—formulæ for which, however, will be found in Part II.

This bath has a tendency to soften the gelatine upon the paper, particularly in hot weather, rendering it liable to abrasion or injury, when changing the prints from one solution to another. To obviate this, the prints should be hardened or toughened, after washing, by immersion for five or ten minutes in a solution of

Powdered alum 2 drachms.

Water 10 oz.

after which they must be thoroughly washed for five or ten minutes by placing them in running water, or constantly changing them—one at a time—from one dish to another containing fresh clean water.

TONING.

Two 20 oz. narrow necked bottles will be required, labelled respectively "Toning Solution No. 1" and "No. 2." Into the first put

TONING SOLUTION, No. 1.

Chloride of Gold .. 15 grains (1 tube).

Acetate of Soda... .. 1 $\frac{1}{4}$ oz.

Water 20 oz.

The beginner may find some difficulty in breaking his tube of gold, which is hermetically sealed, without losing some of the gold chloride contained therein. It may be done with safety by wrapping it in a sheet of clean paper and breaking it by a blow from the outside, the contents—broken glass and all—are then emptied into the bottle, and the required quantity of the soda and water added.

The other bottle contains

TONING SOLUTION, No. 2.

Ammonium Sulphocyanide ... 50 grains.

Water 20 oz.

One part of No. 1, one part No. 2, and two parts water are now mixed, and will be much better if allowed to stand for about an hour before being used. They are then poured into a perfectly clean porcelain dish, which should be reserved for this purpose only—cleanliness throughout all toning operations being absolutely

essential to obtain perfect results. The prints are taken by one corner from the washing water and are placed, one at once, face downwards in the toning bath, which must be kept constantly moving. During the whole time they are in this bath they should be turned over and over one at a time. On first immersion the image quickly changes to a yellow colour, but gradually passes through various stages of sepia, brown, chocolate, to a rich purple-black. When any desired tone is reached, the print should be placed in water containing about half an ounce of common kitchen salt to the pint, which will at once arrest any further toning action. Prints from hard or strong negatives will require to remain in the toning bath longer than those from thin weak negatives.

When all are sufficiently toned they must be well washed as before for five minutes, and then immersed in the

FIXING BATH.

Hyposulphite of Soda	...	...	3 oz.
Sulphite of Soda	...	...	1 oz.
Water	GRAPHIC...	...	20 oz.

and kept constantly moving for ten minutes, after which they must be thoroughly washed in running water, or by changing them from one dish to another, using fresh water every time, for forty-five minutes or an hour. A useful little appliance, called a print washer, for keeping the prints separated and in motion is here illustrated.



It is of the utmost importance that no trace of hypo shall come in contact with the prints or any of the other solutions before fixing, otherwise, stains are almost certain to ensue.

DRYING.

The prints may be dried by laying them upon blotting paper, but on no account must this be allowed to touch

the face of the print or "fluffy" particles of the paper will adhere to the gelatine surface; nor must heat in any way be applied to them to hasten desiccation, or the gelatine composing the film will dissolve and the image become distorted, if it does not completely disappear. Perhaps the simplest method is to suspend them from the wall by a pin through one corner.

TRIMMING THE PRINTS.

When dry the rough edges must be cut away, and the print trimmed to the proper size for mounting. For this a cutting shape or guide, a sharp knife, and a stout piece of glass will be required. Lay the print on the



glass, and having placed the shade in the desired position, hold it firmly with the left hand, and with the right hand run the blade of the knife round the edges of the shape, and if carefully done the rough edges will be sharply cut away.

MOUNTING.

THE prints may now be mounted, and for this purpose paste, starch, arrowroot and other adhesive preparations can be used; but apart from other faults they are liable to cause the print to fade, owing to their turning sour. A small quantity of camphor or carbolic acid added to the starch or arrowroot paste is said to correct this fault.

The following solution is an excellent mountant, and will prevent the photographs from curling or "cockling" as they dry:—

MOUNTING MEDIUM.

Gelatine	...	...	...	...	3 oz.
Glycerine	...	...	...	...	$\frac{1}{2}$ oz.
Methylated spirit	...	...	...	...	2 oz.
Water	...	...	...	...	8 oz.

First dissolve the gelatine, then add glycerine, and finally the spirit. Apply the solution to the back of the prints with a sponge or broad soft brush; lay the print on the card, over that place a sheet of hard blotting paper, and, with the side of the hand, rub the print down, from the centre outwards, turning the print round from time to time, so as to bring each side alternately under pressure of the hand.

The Squeegee here illustrated is a useful adjunct in mounting, and will ensure a more even surface than can be obtained by pressure of the hand.

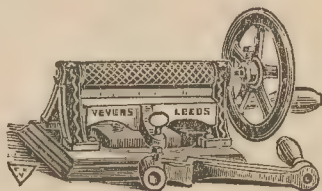


Squeegee.

The photograph is now allowed to dry gradually, and, if a finer and more glossy surface be desired, can afterwards be burnished.

BURNISHING.

THE burnishing bar, after being carefully polished with fine emery or bath brick powder, should be heated over a gas flame or spirit lamp, much hotter than the hand will bear; it is then screwed up under the roller, until there is a space sufficient for a mounted print to pass through. After being cleaned, the print may be passed through three or four times with a continuous movement,—if stopped for a second when over the bar a mark across the photograph will be made. Too much heat will produce blisters, while too little will not yield a satisfactory polish.



Burnisher.

PART II.

ALTERNATIVE METHODS OF DEVELOPMENT.

HYDROQUINONE.

QUINOL, more generally termed Hydroquinone, has rapidly become a favourite developing agent both for dry plates and bromide paper. It has properties claimed for it distinctly superior to pyro : it does not stain the plate or paper ; produces density where pyro fails ; can be used combined with the alkali in one solution, and the same developer can be used for several plates in succession.

Innumerable formulæ have been published, but I have found the following to give the most satisfactory results :—

NO. 1. (HYDROQUINONE SOLUTION).

Hydroquinone	...	...	160 grains
Citric Acid	...	...	50 „
Potassium Bromide	...	...	20 „
Sodium Sulphite	...	...	2 OZS.
Water...	...	...	20 OZS.

NO. 2. (SODA SOLUTION.)

Sodium Hydrate	...	...	2 drachms.
Water ...	...	...	20 ounces.

To develop use equal parts of Nos. 1 and 2. Three or four plates may be developed in succession in one mixture.

The action of this developer is rather slow, from five to ten minutes being required, but the negatives produced have very fine printing qualities.

For over-exposure add more No. 1 Solution.

„ under „ „ „ No. 2 Solution.

FERROUS OXALATE.

No. 1.—Saturated Solution of Oxalate of Potash.

No. 2.— „ „ Sulphate of Iron.

No. 3.—10% Solution of Potassium Bromide.

Made thus:—

Into a bottle containing 1 lb. neutral Potassium Oxalate 12 ozs. of hot water are poured. (No. 1).

A 20-ozs. bottle containing 1-lb Protosulphate of Iron (ferrous sulphate) is filled with hot water. This solution must be kept in a tightly-stoppered bottle. (No. 2).

As the solutions are used the bottles may be filled with water until all the undissolved crystals are taken up.

A 10 % solution of Potassium Bromide is made by putting 1 oz. Bromide in a bottle, and filling up to 10 ozs. with water.

Just before development add to each oz. of No. 1 two drachms of No. 2 and not more than four or five drops of No. 3. For over-exposure, increase No. 3 ten to twenty drops.

This, and the following developer, produce negatives of very fine printing quality.

PYRO-POTASH.

(*Modified from Beach's Formulæ*).

No. 1. (PYRO SOL.).

Warm water (distilled)	...	...	5 ozs.
Sulphite of Soda	...	...	3½ ozs.
Sulphurous Acid	...	...	3½ ozs.
Pyrogallic Acid	...	...	1 oz. (<i>avoir.</i>)

No. 2. (POTASH SOL.).

Water (distilled)	...	...	10 ozs.
Carbonate of Potash	...	...	3 ozs.
Sulphite of Soda	...	...	2½ ozs.

No. 3. (RESTRAINER).

Citrate of Potash	...	...	1 oz.
Water, fill up to	...	...	10 ozs.

No. 1.—Dissolve the sulphite in warm water; when cool, add the two acids. Filter, and keep in stoppered bottle.

No. 2 is made by dissolving the sulphite in half the water, warm, and doing the same with the potash, in the rest of the water, cold. Mix when dissolved.

To develop, add to each oz. of water, 20 minims No. 1 and 30 minims No. 2. Image should appear in from one to two minutes, and be fully developed from eight to fifteen minutes.

For over-exposure add from six to thirty drops No. 3.

For under-exposure increase quantity of No. 2.

A simpler form :—

Carbonate of Potash	...	...	4 ozs.
Water	...	...	4 ozs.

This is used same as pure ammonia (*i.e.*, added in drops) to the usual pyro and water.

SODA.

Ten per cent. solutions of Carbonate of Soda (washing soda) and Bromide of Potassium :—

No. 1.

Carbonate of Soda...	...	...	2 ozs.
Water	...	...	fill up to 20 ozs.

No. 2.

Potassium Bromide	...	...	1 oz.
Water	...	...	fill up to 10 ozs.

To each oz. of No. 1 add three or four drops No. 2 and one grain of pyro. In hot weather the quantity of No. 2 may be increased to eight drops.

For over-exposure increase quantity No. 2.

For under-exposure ,, ,, No. 1.

SODIC SULPHITE

is simply the addition of sulphite of soda to the ordinary ammonia developer, in the proportion of four to one of pyro.

EIKONOGEN.

This developing agent, invented by Dr. Andresen, of Berlin, is a product of coal tar, and the following advantages over Pyrogalllic Acid and Hydroquinone are claimed for it.—First, it will produce a satisfactory negative, full

of detail, where double the exposure would be required when Pyro or Hydroquinone formed the developer ; consequently it is especially useful for developing instantaneous exposures. Secondly, it does not stain or discolour the negative, and, moreover, can be used in place of Ferrous Oxalate as a developer for bromide papers with advantageous results ; like Hydroquinone, when prepared to the following formula, the same solution can be used to develop several plates.

The formula for dry plates recommended by Dr. Andresen is thus prepared :—

(1) 4 ozs. of Sodium Sulphite are dissolved in 60 ozs. water ; to this solution add 1 oz. of Eikonogen.

(2) 3 ozs. Sodium Carbonate are dissolved in 20 ozs. of water.

To DEVELOP.—To $1\frac{1}{2}$ oz. No. 1 add $\frac{1}{2}$ oz. No 2.

For under-exposed plates substitute Carbonate of *Potassium* for the Carbonate of *Soda* in No. 1 solution.

For over-exposure use the Restrainer as recommended for the “Pyro-Potash” Developer.

“EIKOQUINOL.”

A combination of Eikonogen and Hydroquinone suitable for general work, but particularly recommended by Dr. Thresh, M.A., for the development of lantern plates :—

NO. 1 SOLUTION.

Eikonogen	...	...	...	120 grains
Hydroquinone	...	...	...	40 „
Sulphite of Soda	...	...	...	2 ozs.
Potassium Ferrocyanide	...	...	...	20 grains
Glycerine	...	...	...	$\frac{1}{2}$ oz.
Water	...	...	...	fill up to 20 ozs.

NO. 2 SOLUTION.

Carbonate of Potash	...	...	...	1 oz.
Water	...	...	...	fill up to 20 ozs.

To develop use equal parts of Nos. 1 and 2 solutions.

For over exposure increase No. 1 and also add five to twenty drops per ounce of 10% Citrate of Potash restrainer.

For under-exposure add water and increase No. 2.

METOL.

An excellent developer producing delicate gradation and detail in shadows, admitting of shorter exposures than is required for other developers, making it particularly suitable for instantaneous and under-exposed subjects, portraiture, lantern plates and bromide paper. It is, in fact, a universal developer, and as such can be recommended for all amateur work.

No. 1 SOLUTION.

Metol	...	...	...	100 grains
Sulphite of Soda	...	...	...	2 ozs.
Water	...	...	...	fill up to 20 ozs.

No. 2 SOLUTION.

Carbonate of Soda	...	...	...	1 oz.
Water	...	...	...	fill up to 10 ozs.

No. 3 SOLUTION.

Potassium Bromide	...	...	...	1 oz.
Water	...	...	...	fill up to 10 ozs.

For Plates, normal exposure, use three parts No. 1 to one part No. 2. and add ten drops No. 3.

For over-exposure, increase Nos. 1 and 3 Solutions.

For under-exposure, omit Nos. 3 and add water.

For Lantern Plates, use 7 parts Nos. 1 to 1 part No. 2. For black tones, omit No. 3 entirely. For warm tones, over-expose and add No. 3.

For Bromide Paper, 3 parts No. 1, one part No. 2, two parts water.

Only two thirds the exposure necessary for Ferrous-Oxalate development is required.

For Gelatino-Chloride Paper: Print until the image is faintly visible.

AMIDOL.

This reducing agent produces a clean, bright negative of fine printing qualities; it is a useful developer for under-exposure and instantaneous work, and also produces excellent results in the development of lantern plates and bromide paper. It does not keep well in solution, and should, therefore, be added to the developer in a dry state when required.

No. 1 SOLUTION.

Sulphite of Soda	...	...	1 oz.
Water	...	...	fill up to 20 ozs.

No. 2 SOLUTION.

Citric Acid	...	...	1 oz.
Water	...	...	fill up to 10 ozs.

For use, add to each ounce of No. 1, ten drops of No 2 and 2 grains of Amidol.

For over-exposure, increase quantity of No. 2.

For under-exposure, increase quantity of No. 1 and add water.

GLYCIN.

Although this developer cannot be recommended for all-round work, it is invaluable when strong contrasts and clean shadows are required ; it is, therefore, specially suitable for reproduction, micro-photography and lantern slides.

The following will be found a useful formula :—

No. 1 SOLUTION.

Glycin	...	...	180 grains
Sulphite of Soda	...	...	540 „
Carbonate of Potash	...	...	1½ ozs.
Water	...	...	10 ozs.

No. 2 SOLUTION.

Carbonate of Potash	...	...	2 ozs.
Water	...	...	20 ozs.

To develop add one part No. 1 to two parts No. 2.

For further instructions and formulæ on this subject the reader is advised to study that excellent little text book on "Development and Developers" by Dr. Thomas Thresh, price 2d.

INTENSIFICATION.

If the plate has been so much over-exposed that an increase of the restrainer in development does not prevent a thin and flat negative resulting, it should, after fixing and toughening in the alum bath, be intensified. This will add density to the high-lights, thus giving the desired contrast between the lights and shades, but its action must be carefully watched or the negative will be utterly spoilt.

INTENSIFIER.

Bichloride of Mercury ...	...	$\frac{1}{2}$ oz.
Water ...	...	10 ozs.

Wash for half-an-hour and immerse the negative in the above solution (which may be used over and over again) and keep the dish moving until the film commences to turn white, when it is washed for ten minutes and immersed in a bath containing five drops of ammonia .880 to each ounce of water. The film must remain in this bath until it assumes its original black colour, which must also be visible at the back of the negative, before removing it from the dish, when it is well washed and dried as usual. Over-intensified negatives may be reduced by immersion in the fixing bath.

REDUCTION

is sometimes necessary for very dense negatives or for the high-lights in under-exposed plates. To each ounce of the ordinary fixing solution from six to eight drops of the following solution are added :—

Potassium ferricyanide ...	20 grains
Water ...	1 oz.

In this bath the negative is immersed until the desired reduction is gained, when it is well washed. For local reduction the parts to be reduced should be painted with the solution by means of a camel-hair brush.

CLEARING SOLUTION.

Ammonia-developed negatives are often of a yellowish colour, which causes them to print slowly; this "Ammonia stain" may be removed by using the following in place of the ordinary alum bath :—

Citric Acid ...	...	$\frac{1}{2}$ oz.
Sulphate of Iron ...	...	$1\frac{1}{2}$ oz.
Alum ...	...	1 oz.
Water ...	...	10 ozs.

TONING & FIXING IN ONE SOLUTION.

Prints upon gelatino-chloride paper ("Solio," "P.O.P." &c.) can be toned and fixed simultaneously, and,

although this method is said to be not so permanent in its results as the "separate bath" formula given in Part I, a considerable gain in time and labour is obtained in comparison with the latter process.

There are two classes of "combined" toning baths: the "acid" (containing alum) and the "neutral." The latter, in my hands, has always proved the most reliable, and I therefore append formulæ for that method.

Four stock solutions are required, and, as the bath does not keep well when mixed, sufficient solution for the amount of paper to be toned should only be mixed as required, 10 ounces being sufficient to tone a 1/- packet; at the same time about equal bulk of new bath can be added with advantage to one a few days old.

- | | | |
|-------------------------------|--------|--------------------|
| No. 1.—Hypsulphite of Soda | ... | 6 ozs. |
| Water | ... .. | fill up to 20 ozs. |
| No. 2.—Ammonium Sulphocyanide | ... | 1 oz. |
| Water | ... .. | fill up to 10 ozs. |
| No. 3.—Lead Acetate | ... .. | 4 drachms. |
| Water | ... .. | fill up to 10 ozs. |
| No. 4.—Chloride of Gold | ... | 15 grain tube. |
| Water | ... .. | 10 ozs. |

For toning, take in the order given, 7 ounces No. 1, 1 ounce each Nos. 2, 3, or 4. Mix thoroughly until the milky precipitate is redissolved, and allow the bath to stand for half-an-hour before using.

Prints for this bath must be printed considerably deeper than for the separate bath. They are immersed directly into the solution without any previous washing, and must be kept in constant motion. They quickly become yellow and considerable reduction takes place; toning occupies 15 or 20 minutes, and almost any colour can be obtained from sepia to a rich purple, the last being a very pleasing tone.

After toning wash the prints *thoroughly* in running water for 45 to 60 minutes, and hang up to dry.

In hot weather it will be necessary to immerse the prints in the following solution for 5 minutes after toning and washing for a few minutes:

Potash Alum	...	...	...	2 drachms.
Water	...	...	...	10 ozs.

After which wash as usual.

SQUEEGEEING GELATINO-CHLORIDE PRINTS.

A most brilliant glossy surface can be imparted to gelatino-chloride prints by "squeegeeing" upon celluloid, glass, ferrotype, or specially prepared pulp slabs.

The ferrotype plate, although the easiest to use, imparts a surface much inferior to the two last named, glass gives a very smooth gloss but requires considerable care in manipulation, whereas the pulp slabs combine the good qualities of the two without their faults.

For squeegeeing it is essential that the gelatine film of the prints be toughened by immersion in the alum bath, otherwise the prints will adhere to the enamelling surface and nothing short of boiling will remove them.

In selecting ferrotype plates, choose those free from dents and pit marks, as every flaw on the surface will be reproduced on the print. Patent plate only should be used if glass be employed. But whatever material be adopted its surface must be absolutely free from the slightest greasiness, or the prints will adhere: a hot thumb or finger laid for a moment on the surface is sufficient to cause the prints to stick. To remove all trace of greasiness, after washing in clear water, by means of a wad of cotton-wool, dust over and off the face of the glass, ferrotype or slab, a little French chalk or powdered talc; or, better still, polish lightly with a solution of 30 grains spermaceti wax dissolved in 5 ounces of benzine.

Lay the wet print face down upon the polished surface, commencing at one end and lowering it gradually so as to avoid air bubbles. Place a sheet of waterproof cloth or vegetable parchment over the back of the print, and apply the squeegee lightly and equally over the whole. Keep the squeegeed prints in a room at normal temperature, and in a few hours they will be dry and can be readily stripped from their support; but in no case should force be employed to remove them, or the film will be torn.

BACKING.—The difficulty in retaining the highly glossy surface in mounting squeegeed prints, has led to the advisability of “backing” them before removing from the enamelling surface. When the squeegeed print is almost or quite dry, a piece of stout chemically pure paper is attached to it by any good mountant. When dry the whole is removed together, and after trimming, attached to the card by means of a strong solution of gelatine or thin glue brushed round the edges.

PORTRAITURE.

THE difficulties of taking a successful portrait are far greater than for views, and for this reason the amateur must not expect to compete with the professional, who in addition to having a properly arranged skylight to work under, has apparatus and accessories specially made for working this branch of photography.

After thoroughly mastering the details of landscape photography, the amateur will, no doubt, wish to pursue his studies further, and make portraits of his friends, pet animals, and the like. Now, a portrait taken out of doors, with the light falling upon the “sitter” from all directions, would present a very poor, tame, and flat appearance—far from flattering to the person it was supposed to represent. The picture would be wanting in roundness and softness—to be gained only by effective lighting, with the aid of screens and reflectors; consequently it is difficult to take a satisfactory portrait outside, but if the amateur can have the use of a bay window of good size, with judicious lighting and posing, very excellent results may sometimes be gained.

The accompanying diagram represents one side of a room having a bay window: A, B, C, facing, preferably, north. In such a room, for a head and bust portrait, the sitter should be placed as indicated at D; the camera at E; and a large clothes horse, covered with a white sheet to reflect the light upon the sitter about F. If preferred an ordinary bedroom mirror may be used as a reflector.

The reflector is arranged so that the side of the sitter's

face nearest it is rather darker than that near the window. Place something white—a newspaper, for instance—on the sitter's knee to reflect the light under the chin and nose.

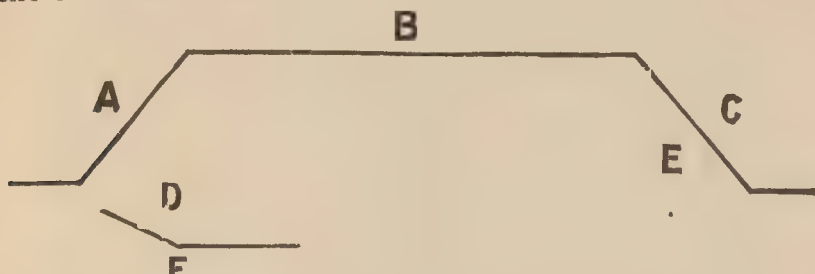
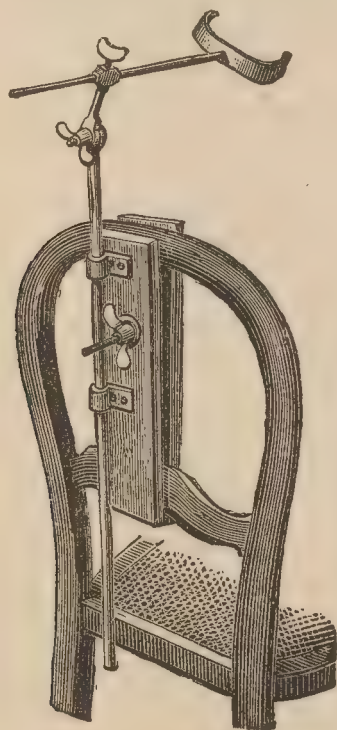


Diagram shewing position of sitter, camera, and reflector, for taking photographs in an ordinary room.

The camera is fixed with the lens about level with the sitter's eyes. Bring the image on the ground glass so that the sitter's mouth will be near the centre of the



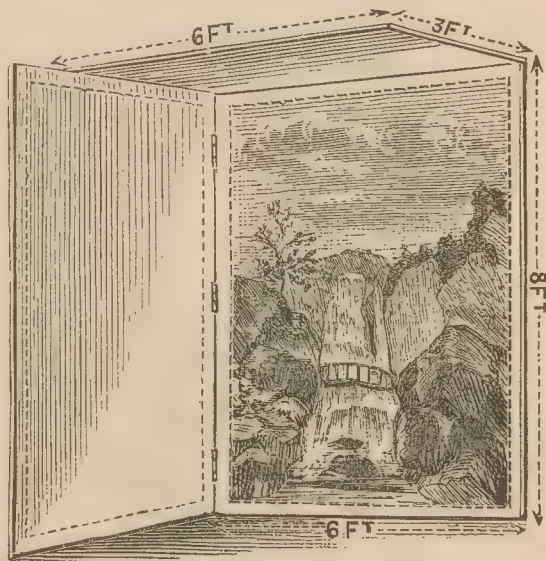
"THE AMATEUR."

Head-rest.

plate, and carefully focus for the eyes—the most important object in a portrait.

Posing is the next part of the operation. A person rarely takes well quite “full-face” or “profile”; the most usual pose is what is known as “three-quarter face”—in this instance, looking a little to the right into the interior of the room, with the eyes turned *slightly* towards the camera, care being taken that the head is not moved at the same time. If the operator has purchased a head-rest it should now be placed in position behind the sitter's head, which is thus supported and kept still during exposure. A useful and inexpensive head-rest is shown above.

Having capped the lens, inserted the dark slide, and drawn out the shutter, quietly warn the sitter and make the exposure, which, indoors, is necessarily rather long. In the summer, rapid plates and lens with large stop, an exposure of from 10 to 30 seconds will be required. A “diffuser” is an almost necessary adjunct in indoor portraiture, particularly when an ordinary window is employed for lighting purposes. The diffuser is a screen consisting of a light frame three or four feet

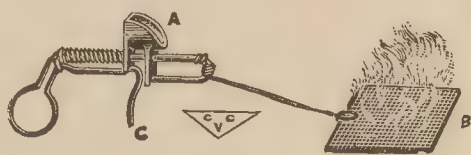


square, covered with some translucent material such as wax paper, vegetable paper or tracing cloth. This is placed between the window and sitter, and has the effect of diffusing or toning down the direct light falling on one side of the face, thus producing a softer and more equal lighting. For out-door portraiture a useful combined background frame and screen is shown in the annexed illustration. It consists of a double frame, measuring 8 ft. by 6 ft., over which as many as four different backgrounds can be stretched. When in use one wing forms the screen to shade one side of the face ; while a smaller coloured frame laid across the top reduces the top light. By judicious management effects equal to those obtained in a photographic studio can be procured.

PORTRAITURE AT NIGHT.

PHOTOGRAPHY by artificial light has often been attempted : electricity, lime-light, pyrotechnic compounds, and other mixtures being adopted as the source of illumination with more or less success ; but not until the sudden fall in the price of magnesium was any method brought within reach of the amateur. The present comparative cheapness of magnesium power and ribbon has led to much experimenting, and many schemes for producing an intense artificial light have been introduced ; but none have proved so practicable and satisfactory as that of Dr. Piffard, an American, who discovered a very simple method of making instantaneous portraits at night, which can be used with the utmost safety, either indoors or in the open air. The sitter is focussed by the aid of gas or any other illuminant ; a bit of pyroxyline (gun-cotton—obtainable at any photographic warehouse) weighing about 10 grains, is placed on a metal plate, and over this is sprinkled twice its weight of magnesium powder. The metal receiver and its contents are held a few feet from the sitter, and a little to one side of the camera, the lens is uncapped, and the cotton ignited. A brilliant flash is the result, sufficiently powerful to fully expose an "ordinary" plate, with a moderately large stop in lens. Another method, equally effective, and

perhaps less expensive is to pour the required weight of powder into a glass tube and then blow the contents through an ordinary gas flame. Another useful arrangement constructed on the principle of a toy pistol, for use with methylated spirit, is here shown, the magnesium being placed in the receptacle A, a few drops of spirit on the brass grid B, and ignited ; on pressing the trigger C the powder is thrown through the flame and a brilliant flash results.

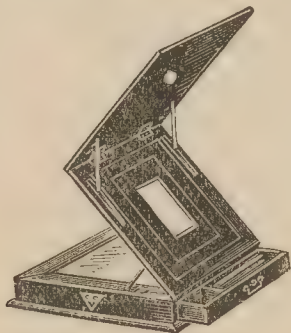


RETOUCHING.

PORTRAIT negatives often require "retouching" to remove from the face freckles, wrinkles, &c., which are generally magnified on the negative.

Retouching is quite an art in itself, and much time and patience is required to become proficient in manipulating the pencil, even if the amateur is gifted with suitable tastes. Professional retouchers reside in every large town ; their charge is moderate (3d. to 9d. for $\frac{1}{4}$ -plates), and I should certainly advise the amateur, until at least he can pencil the negatives properly, to take all his valuable ones to the professor to be retouched.

The materials required are few and cheap : a retouching desk, to hold the negative ; the "medium" ; two or three pencils of different degrees of hardness—say HB



Retouching Desk.

and HHH ; a sharp knife, and a small piece of fine emery paper. The desk, as illustrated, the ingenious amateur should find no difficulty in making himself, or it can be purchased at the dealers for a few shillings.

The pencils must be cut to a long point and afterwards sharpened upon the emery paper. "Ever-pointed" holders with leads (as here illustrated) are obtainable,



and these save much time and prevent waste in sharpening. The medium, which is used to give a "bite" for the pencil, is now applied to the film of the negative ; it is sold in bottles at the dealers, but the amateur may, if preferred, use finely powdered resin, which is applied to the part to be retouched by the finger-tip with a circular motion.

With the soft pencil go over the face, filling in most of the freckles, furrows, &c. ; work the pencil slowly, making the touches very light, and do not put too much lead on. Touch up the white and "lights" of the eyes, the dark part under the eyes, and if necessary, heighten the light down the centre of the nose.

Now, with the other pencil, work over the whole face with short, very fine lines, after the manner of hatching, always following the "grain" of the skin. If the negative be over-exposed and flat, strengthen the high-lights by making the lines closer, and blend them into the shadows, so as to make the image appear soft and round. Should the negative be under-exposed, and there is an excessive amount of shadow or hollow in the cheeks, these can be improved by covering them with a wash of water colours upon the glass side of the negative.

PRINTING PROCESSES.

CARBON PROCESS. (Autotype).

MATERIALS, &c., REQUIRED : Photographic purple carbon tissue, double transfer paper, flexible support, single tint actinometer, squeegee, collodion, bees' wax, resin, turps, dishes, &c.

SENSITIZING SOLUTION.

Bichromate of Potash ...	...	5 drachms
Carbonate of Ammonia ...	...	14 grains.
Water ...	...	1 pint.

The tissue is sensitized by *immersing* in the above for three minutes,—two minutes carbon side down, then reversing it for the remainder of the time. On removal it is squeegeed upon a sheet of clean glass or zinc, to remove the surplus moisture, and at once hung up to dry slowly—which it should do in from six to eight hours in a well-ventilated dark-room. This paper is about twice as sensitive as albumenized paper, but, as the image is not visible during printing, it is necessary to use an actinometer. Johnson's single tint actinometer is a small box, the lid of which, with the exception of a transparent hole in the centre, is of a chocolate colour; the box contains a strip of sensitized albumenized paper which can be fixed under the lid. When the light has coloured the paper to the depth of the colour on the lid, it is termed "one tint"; the strip is pulled forward, and a fresh portion brought under the opening and again exposed as before.

The printer, having found by experiment, how many tints must be made before the tissue has received the proper exposure under a certain negative, if the actinometer and the printing frame are exposed together, and at the same time, correct exposure can always be given to the tissue.

After removing from the frame, the action of light still continues, so that it is advisable to develop the tissue the same day. Take a piece of Sawyer's flexible support, somewhat larger than the tissue to be developed, and rub over the prepared surface a piece of soft flannel dipped in the following :—

WAXING SOLUTION.

Bees' Wax ...	...	1 drachm.
Resin ...	...	3 „
Turpentine ...	...	10 ozs.

and polish off with a clean piece of flannel.

Immerse the waxed support and the tissue in clean cold water, and when both are saturated they are brought together face to face. Lay the adhering pieces, tissue uppermost, on a sheet of glass, and quickly apply the squeegee.

The exposed tissue is now ready for development. Place the print and support in warm water, about 105° Fah. In a few seconds the paper originally bearing the tissue can be stripped off, leaving the picture adhering to the temporary support. By gently lading hot water over this the picture is gradually developed, when it is immersed in cold water for a short time, afterwards in an alum bath for 15 minutes, and after being again rinsed in cold water, is ready for transferring to its permanent support, which may be paper, china, glass, ivory or anything with a smooth surface.

Take a piece of double transfer, the required size, and immerse it in a dish containing warm water about 100° Fah. The picture on the temporary support is placed in transfer paper becomes soft and slimy the two are lightly cold water; as soon as the gelatinous surface of the squeegeed together, and hung up to dry, when the picture may be stripped from the support, trimmed, and mounted.

Should a highly-enamelled surface be desired, the exposed tissue must be developed upon a collodionized plate in the following manner:—

A sheet of plate glass is cleaned, polished with bees' wax, and coated with enamel collodion. The tissue and collodionized plate are placed in cold water for a few minutes, brought in contact face to face, squeegeed, blotted, and placed under pressure for five minutes. The picture is now developed the same as if on the flexible support, but before the transfer backing is dry a piece of thin cardboard is glued to it, and the whole placed under pressure until quite dry, when the card bearing the picture with a beautiful gloss may be cut and attached to the mount.

This process is specially adapted for making transparencies, Christmas Cards, and fancy articles, on ivory,

opal, or other surfaces. Various makers now supply tissue ready sensitized, which makes this process still more simple, and for the beginner; economical.

BROMIDE PAPER.

THIS is a rapid contact printing process, the sensitive paper being exposed to artificial light and afterwards developed and toned; by this process a dozen prints may be made from one negative and finished the same evening.

It is a similar process to gelatino-chloride, but the results obtained are by some considered more artistic than the latter, the tone being pure black and white, greatly resembling a platinotype print. Toning being unnecessary, the operation is more simple than the above.

The paper supplied by the Eastman Co. is manufactured in three grades: A, being a smooth surface thin paper; B, a smooth heavy paper; and C, a rough heavy paper; also a new brand called "Platino-Bromide," a splendid paper for contact printing almost equalling platinotype. The latter is suitable for views and enlargements, and the first quality (A) for portraits.

The paper, which is coated with a film of sensitive gelatine, may be purchased in packages of the required size. As it is very sensitive, all the manipulations must be carried on in the dark-room, lighted only with a ruby lamp or gas turned very low. The paper may be exposed through the negative to daylight, but as the exposure then required is only a few seconds, and the image being latent until developed, it is difficult to give correct exposure to a light which is constantly varying.

Gas-light is best: a stand should be fitted up level with the flame, and about a foot away from it; on this the printing frame rests, and if the exposure for the same negative is always exactly the same, prints of uniform tone will be obtained. The stand may be so made that four or more frames can be exposed at the same time; but care must be observed that each frame is always placed exactly the same distance from the flame for each exposure.

Through a negative of average intensity, at a foot distance from the ordinary "fish-tail" burner, the exposure

required will be from forty-five seconds to two or three minutes ; but it must be remembered that if placed at two feet from the gas the exposure required will be four times as much : that is, the square of the distance from the source of light.

The following solution will be required for development :

No. 1.

Oxalate of Potash	...	...	$\frac{1}{2}$ lb.
Hot Water	...	...	30 ozs.

Test with litmus paper ; make slightly acid with sulphuric acid.

No. 2.

Sulphate of Iron	...	...	$\frac{1}{2}$ lb.
Hot Water	...	...	20 ozs.
Sulphuric Acid	...	...	15 drops.

No. 3.

Potassium Bromide	...	...	2 drachms.
Water	...	...	8 ozs.

To develop, add to 3 ozs. of No. 1, $\frac{1}{2}$ oz. of No. 2, and 30 minims of No. 3.

After development the prints are at once immersed in the following clearing solution :—

Citric Acid	...	...	2 drachms.
Water	...	...	16 ozs.

which must be applied fresh to each half-dozen prints. After washing, the prints are fixed in the usual hypo bath ; and, after two or three hours thorough washing, may be dried and mounted.

Hydroquinone, amidol or metol developers may also be used, and produce a more delicate and somewhat warmer tone than ferrous-oxalate. The same formulæ as for plates, but with the addition of equal bulk of water can be satisfactorily employed.

The “ Britannia ” Works Co.’s, Morgan and Kidd’s, Marion’s, and other “ Argentic Gelatino-Bromide ” processes are analagous to the above, and to them the foregoing instructions are equally applicable.

PLATINOTYPE.

Notwithstanding its many rivals, the platinotype process still maintains the premier position for artistic qualities. The delicate half-tones and the rich "velvety" image produced by this method cannot be equalled by any known printing process.

Platinotype is a matt surface paper, sensitized with a combination of ferric-oxalate and potassium chloroplatinite. It is sold in air-tight tin tubes containing sheets cut to plate size, and also in large sheets. The sensitizing salts are extremely deliquescent and the paper rapidly deteriorates on exposure to the atmosphere; it should therefore be kept in a dry place, and during printing, protected as much as possible from the air, thin sheets of rubber being placed behind it when in the printing frame.

The paper is somewhat more sensitive to light than gelatino-chloride, and printing must only be continued until the half-tones are faintly visible, and the image developed out by means of a solution of Potassium Oxalate.

Until recently, hot solutions were necessary, and this, together with the extra care required in preserving and manipulating the paper, deterred many amateurs from adopting the process; but a special grade of paper known as "AA," "BB" or "CC" (according to the thickness and surface of the paper) can now be purchased, which may be developed by cold solutions. The prints should be developed as soon as possible, after being removed from the frame, unless stored in an air-tight tube. The developing solution consists of

Potassium Oxalate (neutral)	1 oz.
Water	10 ozs.

The prints are floated face down upon this solution, and, as development is affected in from half to one minute, only one print should be developed at a time. Where the desired depth has been reached, the print must be immersed, face down, in two or three changes of dilute acid, consisting of 1 drachm Hydrochloric Acid to a pint of water, to remove the ferric-oxalate. It is

then washed for 15 or 20 minutes, and can then be dried and mounted.

A very simple, and, perhaps more interesting method of development, is to immerse the print in water until limp, lay it face up upon a sheet of clean glass, and apply the developer by means of a fine camel-hair "mop" or flat brush; the brush must be dipped afresh in the solution each time it is passed over the print, otherwise streaky marks may result.

When large sizes are thus developed it is advisable to add glycerine to the developer to retard its action to some extent, one part of glycerine to three of the solution being about the best proportion to use. Development is then much slower, and gives the operator time to cover the whole of the print with solution.

It is often desirable to bring up the image with greater depth in some parts than other portions of the print, such as under-exposed shadows, clouds in dense skies, &c. This "local development" can be done by first brushing pure glycerine over the print, and then applying the developer to the parts to be strengthened by means of the brush. When these parts are almost fully developed, the solution is applied to the whole surface of the print, and the remainder of the image developed.

HINTS.—When printing from hard or under-exposed negatives, place a piece of pale green glass over the frame. Use blue glass in a like manner for flat or weak negatives.

White skies can be printed from weak flat negatives by superimposing a piece of *slightly* damp blotting paper, cut to the shape of the sky and horizon line, behind the paper during printing.

Dense negatives, and those with strong contrasts, should be printed somewhat deeper than the normal.

The developer does not keep after use, and must be freshly prepared for each batch of prints.

The action of the developer ceases when a correctly "exposed" print is fully developed, but a continued

application of the solution tends to sink the image into the body of the paper and produce a grey "mealy" effect.

If the developer is made *very slightly* alkaline with carbonate of soda or potash, a warmer tone is produced.

An acid bath gives colder, greyer tones than if neutral.

In case of under-exposed prints a *warm* developer will often produce satisfactory results, when a cold solution fails.

Paper that has become "bad" by age or damp, may sometimes be "revived" by keeping in a warm oven for a few hours.

ARGENTIC PLATINUM.

This paper has been introduced as a substitute for the ordinary platinum process, the greatly advanced price of which debars many amateurs from its use. Argentic platinum, moreover, offers several advantages over platinotype, being a printing out process, similar in every respect to albumenized paper, and costing even less than the latter. As its name implies, it is a combination of silver and platinum salts, being a special matt-surface paper sensitized on a very strong silver bath, and afterwards toned with platinum; the resulting picture closely resembling a print produced by the more complicated and expensive platinotype process.

The paper, which is sold in sheets and in cut packets, is printed in exactly the same manner as ordinary sensitized albumenized paper, and slightly darker than required when finished. The prints are washed in two or three changes of water in the usual way, and then laid face up on a piece of clean glass or bottom of a dish, and a special toning solution (supplied with the paper) is brushed over the surface with a camel-hair brush or bit of soft sponge. Toning proceeds rapidly until the print has assumed a rich platinum-black colour, when it is immersed for two or three minutes in a 5% (1 in 20) solution of common washing soda, rinsed in clean water, fixed and washed as usual. To produce a brown tone, the solution is diluted with a little water.

TRANSPARENCY PAPER.

This is a tough translucent paper or parchment which is manipulated much in the same manner as Ferro-prussiate paper, and by simply washing in water produces a fine transparent blue picture, which can afterwards be changed to a variety of colours by toning in different solutions. The transparencies this produces can be used for decorative purposes, such as windows, lamp shades, hall lamps, screens, glass doors, conservatories, and have a most charming and artistic effect.

Before exposure the paper is of a green slate tint, which changes to a dirty indigo blue on exposure to the light. A piece of the transparency paper is placed, either side, on the negative in the usual manner, and exposed in the printing frame to daylight, either shade or sunlight as with albumenized paper. The paper can be examined in a yellow or weak white light from time to time, and printing should be continued until the whites of the picture have assumed a deep blue tint and the shadows commence to bleach.

It is then removed from the frame, and can be put on one side for any length of time until required to be finished, when it is well washed for 15 minutes. The olive green tone will then disappear and the picture will assume a bright blue colour.

The prints should be placed between blotting paper under pressure until dry, when they will remain perfectly flat.

For lamp shades, &c., they can be attached to a light cardboard frame by means of glue or paste.

To attach them to glass they must first be immersed in water until limp, then strong clear starch or arrowroot paste should be rubbed well in on the side to be laid on the glass, the glass also being pasted. The print is then carefully laid on the glass, commencing at one corner and slowly lowering the other end so as to prevent the formation of air bubbles. It is then well squeegeed down with the edge of the hand, or by means of an india-rubber squeegee. When set the glass can be cleaned with water, the transparency being waterproof.

VARIATIONS IN COLOUR.

A great many colours can be obtained by immersing in different solutions *at any time* after printing and washing.

VIOLET.—By immersing the blue print in a 25% solution of Acetate of Lead.

GREEN.—Print rather light, wash thoroughly and immerse in water, 4 ozs. ; Sulphuric Acid, 15 drops.

SEPIA.—Wash thoroughly, and immerse for a few minutes in water, 4 ozs. ; Tannic Acid, 1 drachm. Then change them to a bath of Carbonate of Soda, 1 drachm, to water 4 ozs., for a very short period, when they are returned to the acid bath and the operation repeated until the desired tint is gained.

DARK BROWN.—Immerse in Caustic Potash, $\frac{1}{2}$ drachm, to water 4 oz., until the blue tint disappears, and the prints assume a pale orange-yellow colour ; then change them to the above tannic acid bath until as dark as desired.

LILAC.—Immerse in ammonia, 15 drops ; water 4 ozs.

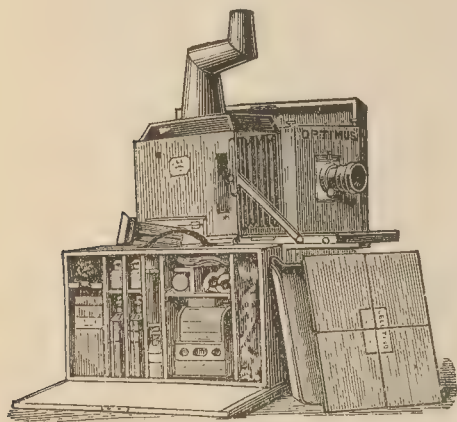
BLACK.—Immerse for a few minutes in a 2% solution of Carbonate of Soda ; wash well and place in a 10% solution of Sulphuret of Soda until black ; wash *thoroughly* and immerse for a few minutes in a 5% solution of Sulphate of Copper until slightly bleached, when it is returned to the sulphuret bath until it assumes a regular and unchangeable black tint.

After immersion in any of the above solutions, the prints must be washed thoroughly before drying.

 COPYING AND ENLARGING.

PHOTOGRAPHS, engravings, and other pictures can be copied "direct" full size, or reduced, in the following manner ; but if an enlarged reproduction be required, the camera bellows must extend much further than those in general use. Attach the picture, by means of drawing pins, to a smooth board, and place it in a vertical position facing the source of light ; if side-light be employed the resulting picture will present a coarse and sandy appearance. The camera is placed with the lens directly opposite the centre of the picture, which is then brought

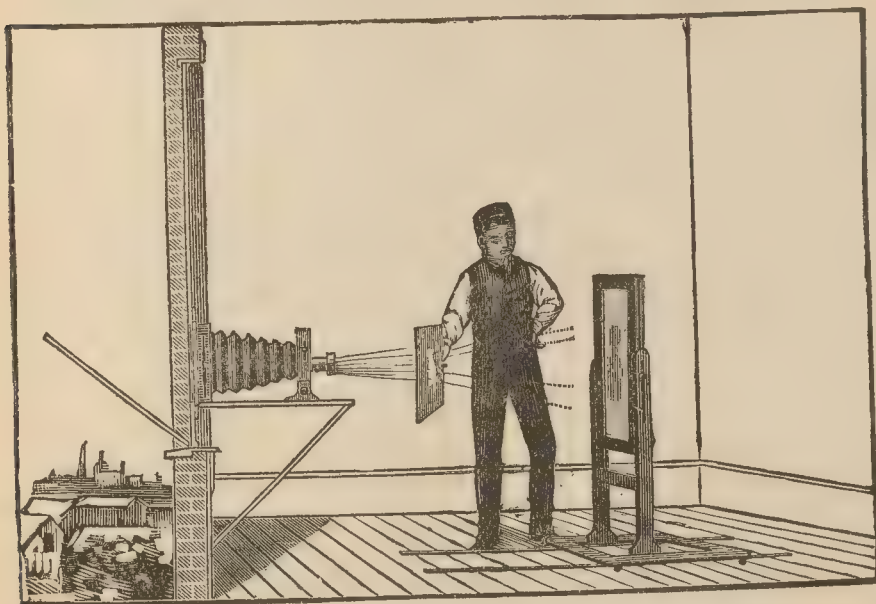
to the desired size, in focus, on the ground glass. To



Enlarging Lantern.

copy same size, the picture and focussing screen must both be twice the focal length of the lens from its diaphragm: to reduce to one-half original size, the distance from the picture to the lens will be twice that from the lens to the focussing screen. Use smallest stop; the exposure required will be from thirty seconds to several minutes.

Enlargements from negatives on bromide paper may be made by daylight or artificial light. The former is the most satisfactory and inexpensive—an enlarging lantern, with very large condensers, being required for artificial light. The accompanying cut illustrates a simple method of enlarging by daylight. The operation



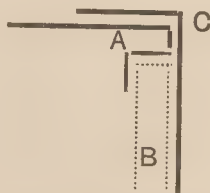
should be conducted in a room lighted only by one window, which must be covered, with the exception of one opening slightly larger than the negative to be enlarged from. The back of the camera, containing the negative to be enlarged with its film side facing the lens (preferably the one used in making the negative) is fixed over the opening as shown. An easel, bearing a sheet of white paper, is erected in a vertical position, parallel with the negative.

The light, direct from the sky, is reflected through the negative by means of a mirror or white cardboard placed at an angle of 45 degrees outside. The size of enlargement is regulated by the distance the easel is placed from the negative. Focus is obtained by adjusting the camera front bearing the lens. A useful "table of enlargements" is given in the "British Journal Photographic Almanac." The lens is capped with ruby glass, so as to permit a non-actinic image to be reflected on the easel, and the sheet of bromide paper is attached to the easel in the required position. An exposure of from 15 seconds to 3 minutes may be given. Develop according to the directions sent with the sensitive paper.

For further instructions read "Enlarging on Bromide Paper" by C. C. Vevers, price 2d.

PIN-HOLE PHOTOGRAPHY,

PIN-HOLE PHOTOGRAPHY can never be of much practical use, on account of perfect "sharpness" of focussing being unobtainable; but it forms an interesting and inexpensive experiment for the photographer during his leisure hours. To work $\frac{1}{4}$ -plate, a tin box should be obtained, measuring $4\frac{1}{4}$ by $3\frac{1}{4}$ by 5 in. long. At one end the tin should be bent to the interior to support the plate, thus:—



Section through one side and back of pin-hole camera.

B, is the sensitive plate ; and C, a lid made to fit over the box A, thus serving the double purpose of keeping the plate in its place, and protecting it from the light. At the other end of the box—in the centre—a minute hole is punched, not larger than a *pin point*. The apparatus is now ready for action. No focussing is needed—the picture is always in equal focus whether the camera is near the object or at a distance, or the sensitive plate is one or ten inches from the hole, which, of course, is the “lens” ; the only difference being that the nearer the plate is to the hole the larger the image, and *vice versa*. The object is brought into the desired position on the plate by taking aim along one edge of the camera, in the same manner as a gun is used. Exposure is effected by uncapping the lens in the usual manner, *i.e.*, removing a small plug of wood from the hole in the camera front. The exposure required is, roughly speaking, about forty times that required with a landscape lens.

The only advantage a pin-hole shows over an ordinary lens is the enormous angle it will include ; thus, a building could be photographed by means of a pin-hole camera when it would be impossible to get to a sufficient distance from it to do so with an ordinary camera and lens ; the prolonged exposure for such work is a matter of little consequence, the only drawback being the want of sharpness already mentioned.

INSTANTANEOUS PHOTOGRAPHY.

ANIMALS, young children, seascapes, and objects in motion, must be taken “instantaneously,” or more correctly speaking, in the fraction of a second. The only apparatus necessary, in addition to the amateur’s outfit for ordinary work, is an “instantaneous shutter” and plates more sensitive to light (requiring proportionately less exposure) than those of ordinary rapidity. A single lens, however, is unsuitable for rapid work, and a “Rectilinear” or “Euryscope” lens should be procured if the amateur does not already possess one. The plates are usually sold as “extra-rapid” or “instantaneous,”

and the price is a little more than for the slower brands. The instantaneous shutter is a piece of apparatus made to fit either on the hood, between the two combinations, or behind the lens—but usually in the former position. Its object is to open and close the lens more rapidly than can be done by means of the cap, and this it must do on pressure of a trigger without shaking the ment. There are instantaneous shut-complicated, in the ranging from about plet and cheapest is the “drop shutter,” thin piece of wood or opening in the centre, other pieces which are fixed on the lens hood (Fig. 1). The exposure can be regulated from about $\frac{1}{8}$ sec. to one fiftieth or less by means of elastic bands. A better, though more expensive form, is shown in the annexed illustration (Fig. 3.)

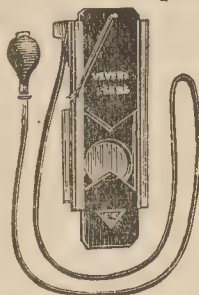


Fig. 1.

or pneumatic ball camera in its move-very many forms of ters, more or less market, at prices 2/6 to 50/- the sim-what is known as which consists of a ebonite having an sliding between two

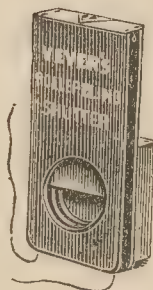


Fig. 2.

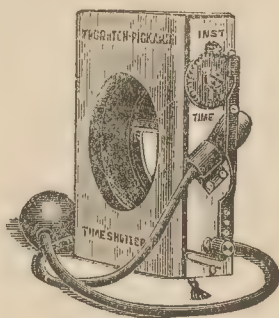


Fig. 3.

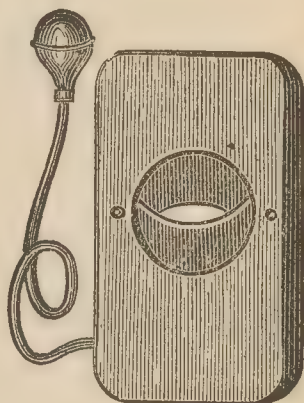


Fig. 4.

INSTANTANEOUS SHUTTERS.

Another form of shutter, which is always set ready for exposure, is illustrated in Fig. 4. To take an instantaneous photograph, the object is focussed in the usual manner, open aperture or largest stop being used in the lens, the shutter is fixed on the lens with the moving

portions covering the opening, the dark slide containing extra rapid plates, is inserted, and at the proper moment the pneumatic ball, or trigger, is pressed, and the moving part of the shutter actuated by a spring or elastic bands rapidly opens and closes the aperture.

For shipping or rapidly moving objects, a "finder"—which is a little instrument for attaching to the camera,—should be used, so as to indicate the precise moment the object is in the centre of the field of view.

All the succeeding operations are the same as for ordinary exposures, except, when any fear of under-exposure is entertained, a slow developer should be used so as to give the details in the shadows time to make an appearance,

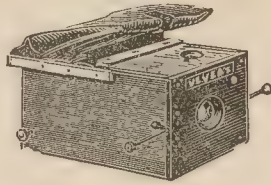
HAND CAMERA WORK.

DURING recent years the hand camera, or, as it is sometimes called, the "detective" camera, has advanced rapidly into popular favour, and the reasons for this are not far to seek. As its name implies, it is a camera made to carry, and to use, in the hand; and, therefore, a stand or tripod upon which to rest it is not necessary. It generally takes the form of a black box or case, almost the whole of the working parts being inside; therefore it is possible to carry it unnoticed, where an ordinary camera could not fail to attract attention. It is usually so constructed as to be ready for immediate use, without the usual preliminaries of focussing, &c.; and, being provided with an instantaneous shutter, photographs can be secured without the knowledge or consent of the subject. Finally, it is generally designed to carry more plates than can be conveniently taken with the ordinary form of camera using dark slides.

The utmost ingenuity has been expended in the design and construction of hand cameras, certainly it has been the subject of more patents than any other piece of photographic apparatus; and so numerous are the different forms of hand cameras now in the market that the beginner may experience considerable difficulty in deciding which pattern to select as most suitable to his requirements.

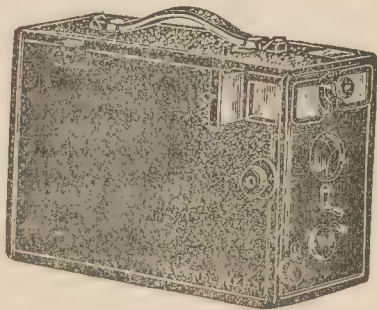
In order to analyse the various types of hand cameras we will first divide them under two heads: those constructed for use with glass plates, and those carrying films.

The *plate camera* can again be divided into two classes: "slide changing" and "magazine changing." The former is made to work with dark-slides, which are inserted much in the same manner as in the ordinary



Bag Changing Camera.

stand camera. This is the simplest form of all, and is the one least likely to get out of order. But dark slides materially increase the bulk and weight of the photographers *impedimentia*, and the time necessary for the insertion of slide and the withdrawal of the shutter—a matter of no little importance in hand camera work—precludes their general adoption; where, however, expense is the first consideration, and the limited number of plates carried of little consequence, then the slide camera can be recommended. The magazine camera, on

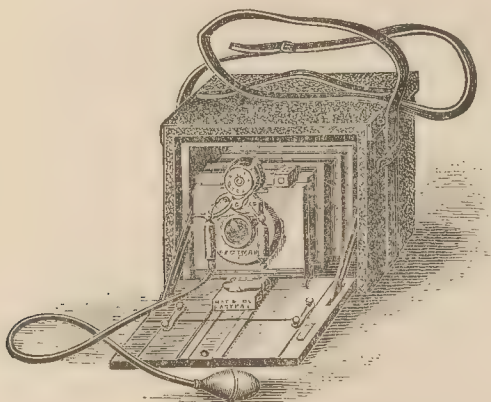


Magazine Pattern.

the other hand, is built to carry, generally, a dozen plates *within itself*: the pressing of a knob, the movement of a lever, the turning of a button or some other mechanical arrangement being sufficient to displace the exposed

plate and bring another into position ready for exposure. This object is attained in scores of different ways—some good, some bad, some indifferent; and the first question in selecting a hand camera is to ascertain if the changing arrangement is perfect—that the whole of the plates can be changed, under the most trying conditions, without fear of any one of them “jamming,” and thus throwing the whole instrument out of gear.

The *film camera* carries the sensitive emulsion coated upon some more or less flexible material—transparent celluloid being that almost universally employed—what are termed cut films are stout pieces of sensitized celluloid cut to the same size as glass plates, and, except that a little more care is necessary in manipulating and developing, used exactly in the same way as glass plates. The advantage obtained by using cut films being, of course, the great reduction in weight, considerable reduction in bulk, and the non-liability to injury through breakage.



Folding Pattern.

The rollable film is a much thinner substance, permitting of its being wound upon a spool. It is in this form fixed in the camera, and as each successive exposure is made it is wound on to another spool also inside the camera. Thus a very large number of exposures can be made without re-changing, some cameras carrying spools for a hundred exposures without any

material increase in bulk over those carrying a dozen. There is also a cheap form of camera, that permits specially prepared spools being changed *in open daylight!*—a great convenience when no dark room is at hand. The troubles of development and after manipulation are, however, considerably increased by the adoption of rollable films, although for long journeys perhaps they constitute the best method of carrying the sensitive emulsion.

In selecting a hand camera a most careful examination and trial of the changing arrangement should first be made, because, unless this be thoroughly simple and absolutely reliable the instrument can be discarded at once without any examination of its other details. The less movements requisite for changing the films, the better ; but it must be seen that in every instance when that movement is made one plate, *and one only*, is changed ; and that when changed it is fully protected from the rays of light passing through the lens when making subsequent exposures.

The lens and shutter should next be seen and tested. It is curious, though nevertheless true, that hardly one hand camera in fifty is fitted with a sufficiently good quality lens for the work required of it. A rectilinear is by far the most suitable type for instantaneous work, but a single lens, in consequence of its moderate price, is often employed in the cheaper instruments. In either case it should work at not less than $\frac{F}{8}$ or $\frac{F}{11}$ —preferably the former aperture—and with that opening it should be seen that it covers sharp to the edges of the plate. It should also be provided with two or three stops which may be set from the outside. In the cheaper form of hand cameras non-achromatic lenses are sometimes used, but this is of no great detriment provided it is fitted to a camera of the “fixed focus” type, and due allowance has been made for the difference between chemical and visual foci.

The shutter should be simple and not liable to get out of order. If working one speed only this should be not less than $\frac{1}{50}$ th of a second, but one adjustable from $\frac{1}{8}$ th to $\frac{1}{100}$ is much to be preferred ; it should also be so made

that "time" exposures can be given when desired. The more expensive hand cameras are also provided with adjustable focus, rising front and swing back, although these movements often tend to increase rather than diminish the beginner's difficulties. Upright and horizontal view finders, in which the object can be *easily* observed in a strong light, should also be attached to the camera.

As will be inferred from the working speed of its shutter, the hand camera is only designed for photography in a brilliant light, and it is useless to attempt to get satisfactory instantaneous pictures in dull weather. Except for continental photography (where the light is more intense than that of our English climate) and seascapes, plates or films of the fastest brand should always be employed. At the seaside, or in the open country, fully exposed negatives can often be obtained on rapid plates in a clear atmosphere, even with an absence in sunlight, but for street scenes, figure and animal studies and the like, sunlight is absolutely essential to secure detail. For still life a comparatively long exposure may be given, but for moving objects (and it must be borne in mind that a man walking slowly across the field of view a few yards distant from the camera, is moving across the plate at a very much higher speed than an express train a mile away) an exposure of not more than $\frac{1}{50}$ th is necessary to ensure sharp outlines. The choice of subject must be left to the amateur's task and discrimination—suffice it to say, the seaside seems to have become the hand-cameraist's paradise; and it is there, if anywhere, where the hand camera more than holds its own with the more unweildy stand camera.

For the development of instantaneous exposures a developer with a tendency to produce softness and detail in the shadows should be selected. Most instantaneous exposures are inclined to under-exposure, therefore a developer best calculated to correct this fault should be chosen. Pyro, metol, amidol, eikonogen, can all be used with advantageous results, but whatever formulæ be adopted, it should be rendered slow in action by

dilution with water. After lengthened experiment the following formulæ has, in my hands, proved superior to all others for snap-shot work, both for the development of plates and films. It keeps well, and being a "one-solution" developer is in a convenient form for tourists. One mixture can be used for half-a-dozen plates, although the best results are to be got by using a fresh solution for every two or three.

No. 1.

Eikonogen	...	...	...	2 drachms.
Metol	...	...	...	40 grains.
Water (cold)	...	...	...	10 ozs.

No. 2.

Sulphite of Soda	...	...	...	2 ozs.
Carbonate of Potash	...	...	...	6 drachms.
Potassium Bromide	...	...	...	30 grains.
Water (hot)	...	...	...	10 ozs.

When cool add No. 1 to No. 2. To develop use one part of this mixture to three parts of water. Correct exposures should be fully developed in four or five minutes. As negative loses density to a slight degree in the hypo, develop somewhat further than usual. For under-exposure increase strength of developer. For over-exposure add from ten to fifty drops of 10% solution of Potassium Bromide.

GLASS POSITIVES AND FERROTYPES.

THOSE pictures (connected in everyone's mind with feasts, fairs, and seaside resorts, and which the itinerant photographer, in charge of a gaudy caravan and delapidated tent, will persuasively inform you can be "finished while you wait, in frame complete, all for the small sum of 1s.," or even less) are produced by the wet plate process, and are known as collodion positives on glass or tin.

The process is very simple and inexpensive, and there is but little variation in the method of making the positive on glass and tin, but as the former is perhaps the handiest for the beginner it will be described first. A glass plate of the required size (such as a waste negative)

is thoroughly cleaned and polished with tripoli, rouge, or French chalk if necessary; it is then coated with Positive Collodion (which can be obtained ready prepared of the photographic chemist) in the same manner as a dry plate is varnished. When the collodion has set, the plate is immersed (in the dark room) in the following:—

SENSITIZING BATH :

Water (distilled)	...	...	10 ozs.
Nitrate of Silver (recrys.)	...	...	1 oz. (<i>avoir.</i>)
Nitric acid	...	...	about 1 drop.

This solution is prepared by first dissolving the silver in the water and placing the bottle containing the solution in the sun until the liquid becomes clear; the sediment is then removed by filtration, sufficient nitric acid added to the solution until blue litmus paper is reddened. The bath is lastly “iodized” by immersing a collodionized plate in the whole solution for two or three hours.

The collodionized plate is placed on the “dipper” and immersed in the sensitizing solution contained in a vertical bath, or in default of the proper dipping apparatus, an ordinary horizontal developing dish may be used. The plate must remain in the silver bath until the apparent greasiness has disappeared and the collodium film has assumed an even, milky white appearance. Time required: from three to six minutes.

The sensitive plate after being drained for a few seconds, is placed in the dark slide, a strip of blotting paper being placed along its lower edge, to prevent the silver staining the woodwork. It is, as soon as possible, exposed in the camera in the usual manner, except that it will require much longer exposure than a dry plate.

The plate is developed by rapidly pouring the following solution on and off until the image appears, which it will do in a few seconds:—

DEVELOPER.

Protosulphate of Iron...	...	...	1 $\frac{1}{4}$ ozs.
Acetic acid	...	...	1 $\frac{1}{4}$ ozs.
Alcohol	...	...	1 oz.
Water	...	...	20 ozs.

Before the picture is fully developed (as judged for dry plate negatives) it is washed and immersed in the

FIXING BATH.

Cyanide of Potassium ...	...	2 drachms.
Water ...	...	8 ozs.

The cyanide is a deadly poison, both internally and externally ; but, if preferred, a saturated solution of hyposulphite of soda may be used as a fixer in its place.

When fixed (about five minutes) the plate is well washed for ten minutes, dried (by heat if desired), and the glass side painted with Bates' Black Varnish. A "mat" and "preserver" are attached, and the whole placed in a "tray," and the picture is finished.

FERROTYPES are collodion positives made by the above process, but with an enamelled metal plate as a support for the film, in place of the glass. They are lighter than glass, do not require so much cleaning, and the tin being japanned black or chocolate, do not need backing with black paint.

TRANSPARENCIES AND LANTERN SLIDES.

The exquisite beauty of photography is never better exemplified than when its productions take the form of a glass transparency ; for the adornment of the home—in windows, screens, lamp shades, &c.—it stands without a rival, and in the form of lantern slides it delights our friends during the long winter evenings with pleasant entertainment.

As a window transparency and a lantern slide are produced in the same manner, the following instructions apply equally well for either, the only difference being that while the lantern slide must be confined to one standard size ($3\frac{1}{4}$ inches square), the size of the transparency is unlimited. They can be made by contact, reduction, or enlargement, and no great difficulty attends either method, although the former is much the simpler and quicker process. On the other hand, a transparency made by reduction is generally superior in point of detail and "crispness" to one by contact ; whilst enlargement should only be adopted in exceptional cases, on

account of the necessary granular appearance that must result.

By CONTACT.—Although special frames are sold for the purpose, with a little care the ordinary printing frame can be employed with satisfactory results, the only precautions to be observed being that the springs are not too powerful as to break the glass, and that an equal pressure is applied to every part of the plate to be exposed.

The transparency or lantern slide maker must next decide whether he prefers black or warm tones, and purchase suitable plates accordingly. Almost every plate maker supplies two brands of plates: "bromide," yielding black tones, and "chloride," upon which almost any colour from red to purple black can be obtained either by development only, or by an after toning of the image with the salts of the precious metals, gold, platinum, and uranium.

Whichever type of plate be used, the operations of filling the frame and development must be conducted in the dark room, and exposure should be effected by artificial light in preference to the variable intensity of daylight. The flame of an ordinary "fish tail" gas burner is, perhaps, the simplest and most regular light; but oil, electricity, or magnesium, can be employed according to circumstances, with equal effect.

If the transparency is to be made from a negative its own size, the plate is simply placed face down upon the film side of the negative in the printing frame, care being taken that no particles of dirt or dust remain between the two to cause unequal contact, and consequent loss of sharpness in the resulting image. Sometimes, too, the glass of either negative or sensitive plate possesses an unequal surface, in which case it is almost impossible to obtain a sharp impression; when such a difficulty arises, the only remedy is to make the transparency in the camera, as afterwards described. When the transparency, as in the case of lantern slides, is to be made from a negative of larger dimensions, the best portion of the picture should be chosen and the plate laid there.

on ; in many instances it is a decided advantage to be able to omit some part of the negative although a quarter-plate negative (being $4\frac{1}{4}$ in. by $3\frac{1}{4}$ in.) only admits of this being done in one direction. When a number of slides or transparencies are to be made from the same portion of a negative, it is advisable to gum two or three strips of paper, indicating the exact size of the transparency, to the glass side of the negative, when the plates can successively be placed in the same position, by holding the negative in the frame up to the ruby light.

The exposure depends upon the character and make of plate used, the density of the negative, and the intensity of the light employed. Bromide plates are all much quicker than chloride plates, and at two feet (about the best distance for lantern slides) from a gas flame, from a negative of normal density an average exposure of 15 seconds for bromide and 25 seconds for chloride plates will be necessary for most brands. When larger transparencies than lantern size are to be made the distance from the flame must be increased to ensure equal illumination over the whole surface, and at the same time the necessary exposure will be materially increased.

In the treatment of chloride plates, the desired tone must be considered when exposing : a full, almost over-exposure, is required for the warmest reds and sepias, while somewhat under-exposure yields blacker tones. At this stage, also, the faults of exposure and development of the negative can be corrected to a great extent : over-exposure through an under-exposed or hard negative will destroy the harsh contrasts and "soot and chalk" effect only obtainable from the same negative when printing upon paper, while under-exposure will yield more pleasing results from a flat or weak negative.

Skies can be blocked out, clouds printed in, and all other dodges adopted as in ordinary paper printing, if increased care be observed to avoid sharp outlines, which are more likely to occur on account of the very brief exposure given. When printing in clouds, an exposure of, at most, one-tenth that given through the negative is all that is necessary, otherwise, the effect will be too heavy.

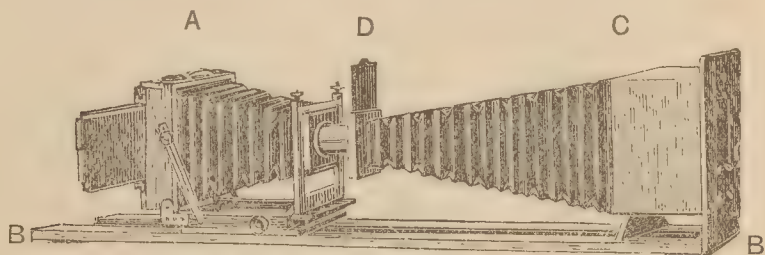
When a considerable number of negatives are to be printed from, they should be sorted out in sets of four of equal density ; they can then be placed in frames in the form of a square round the source of light, and all exposed together for an equal period.

Some subjects, seascapes particularly, are most effective when seen with a white margin. This is obtained by placing an opaque paper mask between negative and plate when printing ; for lantern slides, the ordinary mask used when " binding-up " can be thus employed, and afterwards omitted in the final operation.

Any of the formulæ given on pages 33 to 38 can be employed for the development of lantern plates and transparencies, it being advisable in all cases to use them in a more diluted state than is required for negative work. Ferrous-oxalate produces a very clear transparency of a somewhat blue-grey tone ; hydroquinone yields heavy blacks and should be adopted when developing transparencies from flat or over-exposed negatives ; the other developers all produce more or less, warm tones, and very pleasing results can be obtained by combining hydroquinone with metol or eikonogen. Development must be continued only so far as to procure the necessary detail in the shadows, and must be stopped before the sky and high-lights commence to veil over. For lime-light, the lantern slide may be slightly denser than is desirable for use with an oil lamp in the lantern. Fix in *fresh* hypo-bath and wash as for negatives.

BY REDUCTION.—When lantern slides are to be made from larger negatives, a double or " reducing " camera becomes necessary. The process is simply that of photographing the negative, no light being allowed to enter the lens except that passing *through* the negative. The essentials for reducing are, therefore an ordinary camera, lens (that will cover $3\frac{1}{4}$ inch square, or more) and dark slide fitted with a carrier to take the lantern plate ; a support for the negative and some means of excluding light between it and the lens. A makeshift arrangement can be devised by using an ordinary plate " carrier " for the negative and a few bits of wire or stout twine to

support a dark cloth between the carrier and the camera, the whole being placed upon a flat board or table, care being observed that the lens is exactly opposite the centre of negative, and its axis at a right angle with the plane of the negative. If reduction is *always* to be made from the same size negative and the same lens always employed, a "fixed focus" box camera can be used, having aperture at front for negative and carrier for slide (containing the sensitive plate) at back, with a partition bearing the lens fixed between the two at the correct focus. But when negatives of varying size are to be copied, or, as is often the case, it is only desirable to reproduce a portion of a negative, the conjugate foci is determined by the amount of reduction, and some means must be adopted so that the lens can be placed at any distance from both negative and plate. A useful arrangement is here shown :

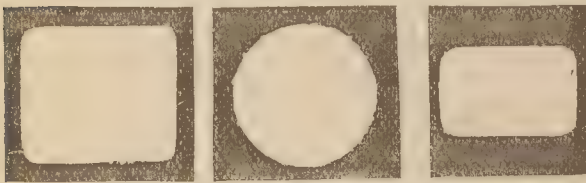


A is the amateur's ordinary camera, fixed upon a board sliding between the rails B B ; C is a box with carrier for negative permanently fixed to the rails or baseboard B B, and having a long bellows extension front, terminating in a wood front to fit on hood of lens (D) after the manner of an instantaneous shutter. The negative in carrier is directed towards the source of light (daylight or artificial), the size of reproduction determined by adjusting the distance between the lens and negative, and focus by the distance between lens and plate. When artificial light is the illuminant it will be necessary to impose a sheet of ground glass or tissue paper between it and the negative a few inches away from the latter; for daylight this is unnecessary. The exposure required is considerably more than for contact, from 60

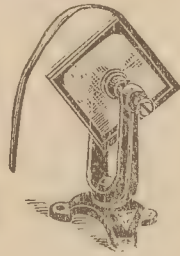
seconds to daylight, or 4 minutes when the negative is three feet away from gas or good oil lamp. Development, &c., is the same as for contact work.

By ENLARGEMENT.—Enlarged transparencies can be made in the apparatus illustrated above, provided the ordinary camera has long enough extension ; or the usual methods of enlarging upon bromide paper and opals can be employed, as described on page 57.

MOUNTING LANTERN SLIDES.—When the developed lantern plate has been fixed, washed and dried, an opaque paper “mask,” with suitable shaped opening, should be laid upon the film side, and upon this a thin “cover glass” the same size as the transparency is placed, and the edges of the two glasses bound together with a strip of well gummed paper, about half-an-inch wide. A useful clamp for holding and revolving the slide during the binding process is here shown. Two



Standard shapes in Slide Masks.



Binding Clamp.

white “spots” should be stuck upon the *film* side at the top corner of the slide as a guide for the lantern operator.



WEIGHTS AND MEASURES.

It must be noted that in photographic formulæ *apothecaries'* weight is adopted, while in buying and selling chemicals the *avoirdupois* weight is employed. Thus, an ounce of, say, pyrogallic acid when purchased will only contain $437\frac{1}{2}$ grains, but when weighed for use should contain 480 grains, unless otherwise stated in the formulæ.

APOTHECARIES' WEIGHT.

SOLID.

20 grains	... equal ...	1 scruple	... equal ...	20 grains.
3 scruples	,, ...	1 drachm	,, ...	60 ,,
8 drachms	,, ...	1 ounce	,, ...	480 ,,
12 ounces	,, ...	1 pound	,, ...	5760 ,,

FLUID.

60 minims	... equal ...	1 drachm.
8 drachms	,, ...	1 ounce.
20 ounces	,, ...	1 pint.
8 pints	,, ...	1 gallon.

AVOIRDUPOIS WEIGHT.

27.343 grains	... equal ...	1 drachm.
16 drachms	,, ...	1 ounce equal ... $437\frac{1}{2}$ grs.
16 ounces	,, ...	1 pound ... 7000 ,,

CONVERSION OF FRENCH INTO ENGLISH WEIGHTS

1 gramme	equal	$15\frac{3}{8}$ grains.
4 grammes	,,	$61\frac{3}{8}$,, or 1 drachm $1\frac{3}{8}$ grains.
30 ,,	,,	462 ,, or 7 drachms 42 ,,

CONVERSION OF FRENCH INTO ENGLISH MEASURES:

1 cubic centimètre	equals	17 minims (drops).
4 ,,	,,	68 ,, or 1 drm. 8 minims.
30 ,,	,,	510 ,, or 1 ounce 30 ,,

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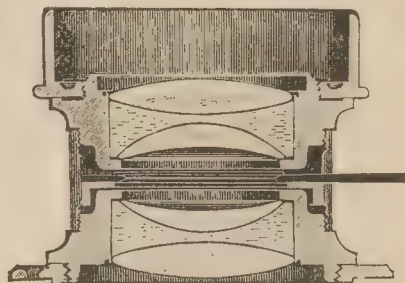
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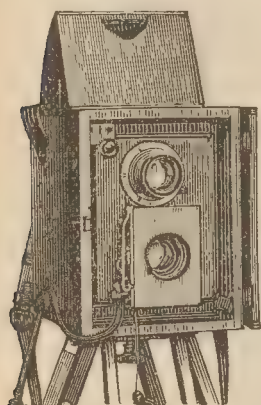
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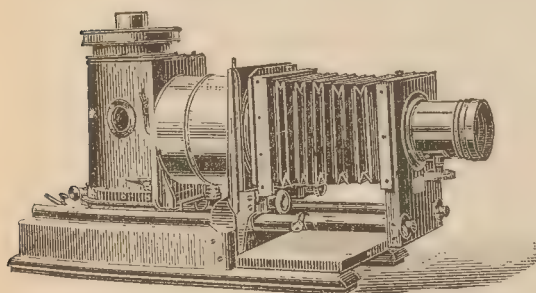
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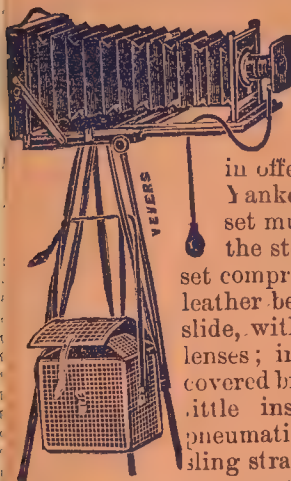
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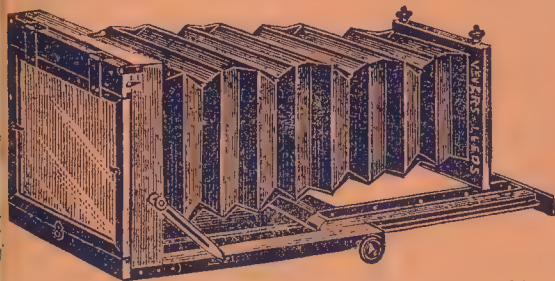
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An estimate for any other size will be given by return of post.

"Phœbus" Camera & Slide only: $\frac{1}{4}$, 42/6; $\frac{1}{2}$, 55/-; 1-1, 75/-; 12x10, 125/-.



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"Defiance" Camera.

This Camera has been designed to meet the demand for a good, sound, long-focus Camera, at the lowest possible price.

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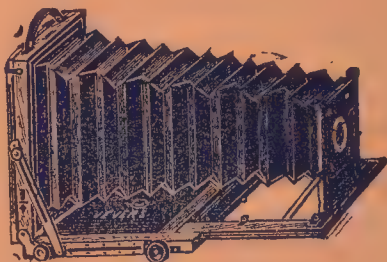
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(Particularly suitable for hot climates).

Although the price is so extremely moderate, this instrument will be found equal in every respect to the most expensive London-made cameras.

Size	$\frac{1}{4}$	$\frac{1}{2}$	1-1	10x8	12x10	15x12
Price (with one slide)	57/6	77/6	105/-	140/-	175/-	210/-		
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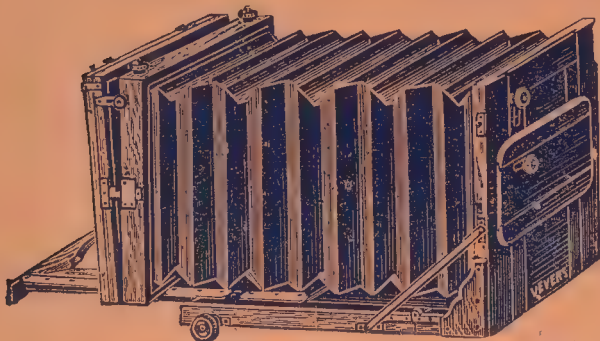
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This pattern permits of an unusually long extension (the $\frac{1}{2}$ -plate size racking out 19 inches) which renders it invaluable for copying purposes. It has double sliding fronts, so that lens can be moved in either a vertical or horizontal direction. It is also provided with reversing and double swing back. The smaller sizes can also be easily adapted for stereoscopic work.

The quality of the materials and workmanship is exquisite, and a handsomer or more perfect instrument cannot be produced. The attention of professional photographers, engineers, architects, photo-mechanical workers, &c., is particularly called to this camera.

The subjoined prices include one best book-form double slide with spring locks, multiplex hinge shutters, &c. :-

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Price	£3 15s.	£5 5s.	£7	£8 10s.	£9 10s.	£11 10s.	£16	£20
Brass Binding extra	15/-	17/6	20/-	22/6	25/-	30/-	40/-	50/-
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Second quality camera and slide	50/-	75/-	105/-	145/-	175/-	—	—	—

*The $\frac{1}{2}$ -plate size is adaptable for use as a Stereoscopic Camera. Price of division, extra front, &c., 5/-
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Warranted the strongest and most rigid four-fold stand in the market.

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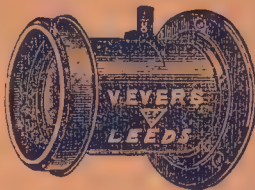
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Although so remarkably low in price, these lenses will be found to be equal to the most expensive. We have hundreds of letters testifying to their superiority over lenses costing three times their price. Work at f-8, with set of Waterhouse Stops in case, loose hood, focal length, &c., engraved on mount. Each lens will cover size larger than indicated.

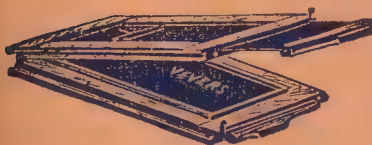
To cover	...	5 x 4	7 x 5	9 x 7	10 x 8	12 x 10	15 x 12
Approximate focus	...	5½	7½	10	12	16	20 in.
Price (Waterhouse)...		18/6	25/-	32/6	60/-	70/-	95/-
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Single Lenses from 2/6. Hand Camera Lenses from 5/6. Periscopic Rectilinears, W.A. Rectilinears, Rapid Euryscopes, Portrait Lenses, &c., &c.



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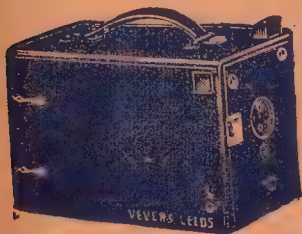
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Size	1-1
Price, Solid Pattern, with Composite Shutters, each	2/6	4/-
" " " " Celluloid	3/3	5/6
" " " " " "	4/-	7/-
Extra, with Shutters to draw completely out	1/-	1/6

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The "Veveo" No. 1.—A really high-class Camera at a moderate price. Exceedingly light and compact. Carries 12 ¼-plates in sheaths, superior rapid lens, time and instantaneous shutter, automatic indicator showing number of each plate as exposed, two sunk reflecting finders with shades. Plate changing mechanism is wonderfully simple and never gets out of order. Covered black morocco, handsomely finished. Price £2 7s. 6d.

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Vevers' Roller Blind Shutter.—With Cork or Mahogany Backs. A thoroughly reliable shutter for varying exposures—from instantaneous to time. 2 in., 3/-; 3 in., 5/-. Postage 3d. Stereoscopic Roller Blind 6/6 each.

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Vevers' "Ever Ready."—A neat and light little shutter in nickelled silver, for time or instantaneous, with pneumatic release, $\frac{1}{4}$ & $\frac{1}{2}$ -plate, 8/6; 1-1 plate, 12/6

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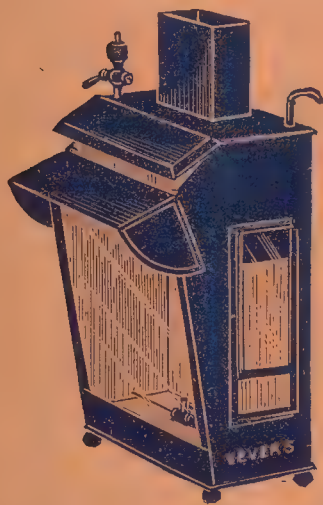
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When ordering, please give dimensions of Slides.



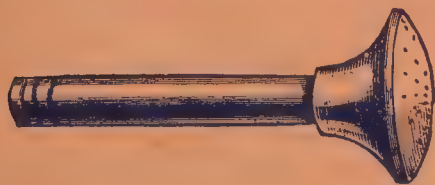
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In Brass, 1in., 9d.; 1 $\frac{1}{2}$ in., 1/-;
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For quickly and safely washing negatives and Prints. Distributes the water in a fine spray over a large surface.

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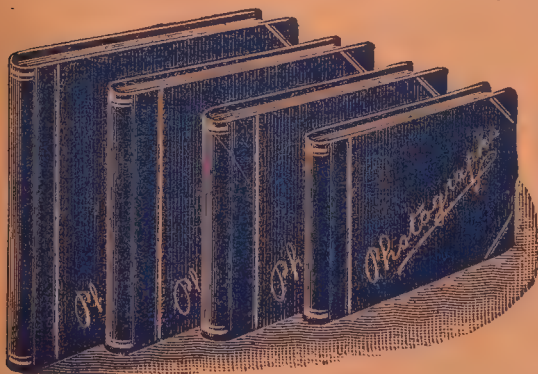
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No. 2.

Vevers' New "Photourist" Album.

A "slip-in" Album for unmounted prints, which can be instantly removed or changed.



Handsomely and strongly bound half Moroccoline, stout toned or tinted card leaves with linen hinges, and word "Photographs" blocked in gold on cover.

Size	For 12.	24	48 prints.
$\frac{1}{4}$ -plate	10d.	1/3	2/-
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Ditto, in half roan, for 48 prints: $\frac{1}{4}$, 2/6; $\frac{1}{2}$, 4/-; 1-1, 5/6.

An enormous variety of Albums, Mounts, Opaline Materials, &c.

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For "print-out" opals, up to $\frac{1}{2}$ -plate, 5/-. Extra back, for use with above frame, for printing lantern slides, 1/9 each.



C. C. VEVERS, 140 BRIGGATE, LEEDS.

Vevers' Lanterns and Accessories.

ARE 20 PER CENT. BETTER VALUE THAN ANY IN THE TRADE.

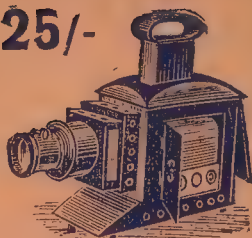
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Vevers' "Defiance" Japaned Lantern, full size, with 4in. condensers, three wick lamp, 2in. wicks, best quality front lens, etc., doors at side and back, 25/-.

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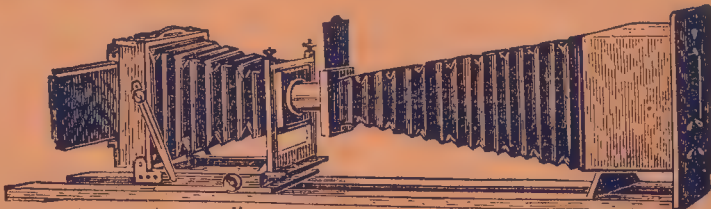


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VEVERS' LANTERN SLIDE CAMERA.

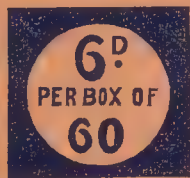


This apparatus, used in conjunction with an ordinary camera and lens, can be employed either for reducing (for lantern slides, &c.), copying same size, or enlarging, by gaslight or daylight, in or out of doors, in horizontal or inclined position.

The $\frac{1}{2}$ -plate apparatus is fitted with $\frac{1}{4}$ -plate carrier, and the 1-1 plate with $\frac{1}{2}$ and $\frac{1}{4}$ carriers.

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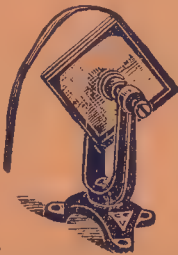
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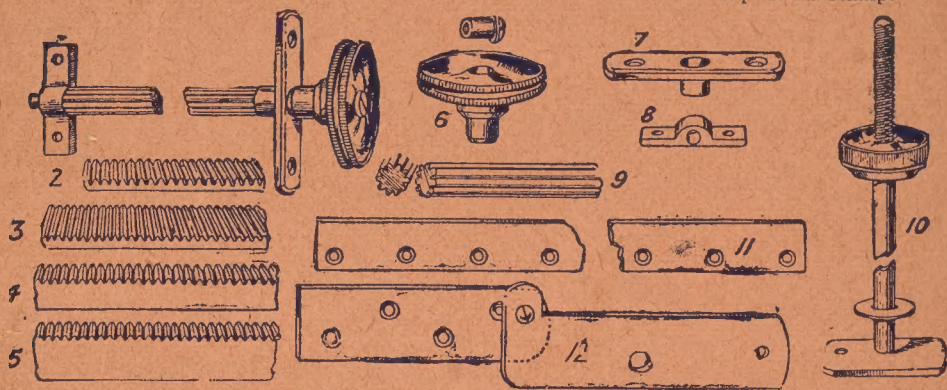
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